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Guide for the application of the Uniform Technical Prescription concerning the subsystem: “Rolling stock – Freight Wagons” (UTP WAG)

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This document is a guide for the application of the UTP WAG. It does not contain any legal requirements. The purpose of this document is solely to facilitate the uniform application of the UTP WAG. For the applicable legal ~~provisions~~requirements, see UTP WAG.

0. DOCUMENT INFORMATION

0.1 Amendment Record

The basis of this document is the ERA guide for the application of the TSI for freight wagons with reference ~~ERA/GUI/07-2011/INT~~ GUI/WAG TSI/2021, version 3.0 dated 15 February 2021.

The blue rectangles ~~such as this one~~ in this document, such as the one this text is written in, contain information relevant to the application of the OTIF UTP for freight wagons, ~~reference A-94-02/2.2012, version 7~~ which is in force as of 1.1.2022 and which is further referred to as UTP WAG. Because the WAG TSI and UTP WAG are ~~fully~~ equivalent in the meaning of Article 13 § 4 letter b of the APTU UR, much of the information in the TSI application guide is also relevant to application of the UTP.

All original OTIF texts ~~edited~~ in this application guide are ~~by OTIF is~~ in blue rectangles. All other texts are~~, which means that without the blue rectangles this document corresponds exactly to~~unaltered texts copied from the ERA application guide.

As a general principle, where the guide refers to TSI, this can also be taken to cover the UTP. Where the guide uses the term Member State, this corresponds to the term Contracting State in the meaning of COTIF. Where this is not the case, this is pointed out specifically.

The OTIF reference

Version Date	*Section*	*Description*
TECH-22014 version 1 18.5.2022	Track changes throughout the whole document compared to the OTIF texts of the UTP WAG application guide of 21.10.2013	Working document for WG TECH 46

Table of Contents

1. SCOPE OF THIS GUIDE

This document is an annex to the 'Guide for the application of TSIs'. It provides information on the application of Commission Regulation (EU) No 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem 'rolling stock — freight wagons' as amended by Commission Regulation (EU) No 1236/2013, Commission Regulation (EU) 2015/924, Commission Implementing Regulation (EU) 2019/776 and Implementing Regulation 2020/387 (further referred to as 'WAG TSI').

The guide should be read and used only in conjunction with the WAG TSI. It is intended to facilitate its application, but does not replace it. The general part of the 'Guide for the application of TSIs' should also be considered.

The information in this guide relates ~~equally~~ to the application of the UTP WAG in the version that entered into force on 1.1.2022. The WAG TSI application guide on which this document is based~~,~~ is published on the website of the European Union Agency for Railways~~ Agency:~~ ~~http://www.era.europa.eu/Core-Activities/Interoperability/Pages/TSI-Application-Guide.aspx~~

https://www.era.europa.eu/sites/default/files/activities/docs/wag_tsi_application_guide_v3_final.pdf

1.1 Content of the guide

In section 2 of this document, extracts of the original text of the WAG TSI are provided in shaded text boxes, which are followed by a text that gives guidance.

Guidance is not provided for clauses where the original WAG TSI requires no further explanation.

Guidance is of voluntary application. It does not mandate any requirement in addition to those set out in the WAG TSI.

Guidance is given by means of further explanatory text and, where relevant, by reference to standards that demonstrate compliance with the WAG TSI. Relevant standards are listed in Appendix 1 of this document, and their purpose is indicated in the column 'purpose' of the table.

1.2 Document reference/s

Table 1. Document reference/s

DOCUMENT REFERENCE	TITLE	LAST ISSUE
(EU) 2016/796	Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC) No 881/2004	L 138, 26.5.2016, p. 1-43
(EU) 2016/797	Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union	L 138, 26.5.2016, p. 44-101
(EU) 2016/798	Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety	L 138, 26.5.2016, p. 102-149
2012/34/EU	Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area	L 343, 14.12.2012, p.32-77
2010/713/EU	Commission Decision 2010/713/EU of 9 November 2010 on modules for the procedures for assessment of conformity, suitability for use and EC verification to be used in the technical specifications	L 319, 4.12.2010, p. 1-52

DOCUMENT REFERENCE	TITLE	LAST ISSUE
	for interoperability adopted under Directive 2008/57/EC of the European Parliament and of the Council	
768/2008/EC	Decision 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC	L 218, 13.8.2008, p. 82-128
(EC) 765/2008	Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93	L 218, 13.8.2008, p. 30-47
(EU) No 321/2013	Commission Regulation (EU) No 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem 'rolling stock — freight wagons' of the rail system in the European Union and repealing Decision 2006/861/EC	L 104, 12.4.2013, p. 1-56
(EU) 2018/545	Commission Implementing Regulation (EU) 2018/545 of 4 April 2018 establishing practical arrangements for the railway vehicle authorisation and railway vehicle type authorisation process pursuant to Directive (EU) 2016/797 of the European Parliament and of the Council	L 90, 6.4.2018, p. 66–104

1.3 Definitions and abbreviations

Table 2: Definitions

TERM	DEFINITION/ SOURCE
Acts issued by the Agency	Are those listed in Article 4 of Regulation (EU) 2016/796 of the European Parliament and of the Council (Agency Regulation)
Basic parameter	Any regulatory, technical or operational condition which is critical to interoperability and is specified in the relevant TSIs (Article 2(12) of Directive (EU) 2016/797)
Basic design characteristics	Parameters that are used to identify the vehicle type as specified in the issued vehicle type authorisation and recorded in the European Register of Authorised Vehicle Types ('ERATV') (Article 2(2) of Regulation (EU) 2018/545)
Conformity assessment	Process demonstrating whether specified requirements relating to a product, process, service, subsystem, person or body have been fulfilled (Article 2(41) of Directive (EU) 2016/797)
Conformity assessment body	Body that has been notified or designated to be responsible for conformity assessment activities, including calibration, testing, certification and inspection; a conformity assessment body is classified as a 'notified body' following notification by a Member State; a conformity assessment body is classified as a 'designated body' following designation by a Member State (Article 2(42) of Directive (EU) 2016/797)
Contracting entity	Public or private entity which orders the design and/or construction or the renewal or upgrading of a subsystem (Article 2(20) of Directive (EU) 2016/797)
European Register of Authorised Types of Vehicles (ERATV)	Register of types of vehicles authorised by the Member States for placing in service. It contains the technical characteristics of vehicles' types as defined in the relevant TSIs, the manufacturer's name, dates, references and Member States granting authorisations, restrictions and withdrawals (Article 48 of Directive (EU) 2016/797)
Existing rail system	Infrastructure composed of lines and fixed installations of the existing, rail network as well as the vehicles of all categories and origin travelling on that infrastructure (Article 2(16) of Directive (EU) 2016/797)

TERM	DEFINITION/ SOURCE
Harmonised standard	European standard adopted on the basis of a request made by the Commission for the application of Union harmonising legislation (Article 2(1)(c) of Regulation (EU) No 1025/2012)
Infrastructure Manager	Anybody or firm responsible for the operation, maintenance and renewal of railway infrastructure on a network, as well as responsible for participating in its development as determined by the Member State within the framework of its general policy on development and financing of infrastructure (Article 3(2) of Directive 2012/34/EU)
Non-application of a TSI	Certain circumstance, by which projects can be exempted from having to comply with all or part of a TSI or TSIs (Article 7 of Directive (EU) 2016/797)
Open point	Certain technical aspect corresponding to the essential requirements, which cannot be explicitly covered in a TSI (Article 4(6) of Directive (EU) 2016/797)
Placing in service	All the operations by which a subsystem is put into its operational service (Article 2(19) of Directive (EU) 2016/797)
Placing on the market	First making available on the Union's market of an interoperability constituent, subsystem or vehicle ready to function in its design operating state (Article 2(35) of Directive (EU) 2016/797)
Project at an advanced stage of development	Any project the planning or construction stage of which has reached a point where a change in the technical specifications may compromise the viability of the project as planned (Article 2(23) of Directive (EU) 2016/797)
Railway Undertaking	Railway undertaking as defined in point (1) of Article 3 of Directive 2012/34/EU, and any other public or private undertaking, the activity of which is to provide transport of goods and/or passengers by rail on the basis that the undertaking is to ensure traction; this also includes undertakings which provide traction only (Article 2(45) of Directive (EU) 2016/797)
Register of infrastructure (RINF)	Register of infrastructure indicates the main features of fixed installations, covered by the subsystems: infrastructure, energy and parts of control-command and signalling. It publishes performance and technical characteristics mainly related to interfaces with rolling stock and operation (Article 49 of Directive (EU) 2016/797)
Renewal	Any major substitution work on a subsystem or part of it, which does not change the overall performance of the subsystem (Article 2(15) of Directive (EU) 2016/797)
Specific case	Any part of the rail system which needs special provisions in the TSIs, either permanent, because of geographical, topographical or urban environment constraints or those affecting compatibility with the existing system, in particular railway lines and networks isolated from the rest of the Union, the loading gauge, the track gauge or space between the tracks and vehicles strictly intended for local, regional or historical use, as well as vehicles originating from or destined for third countries (Article 2(13) of Directive (EU) 2016/797)
Substitution in the framework of maintenance	Any replacement of components by parts of identical function and performance in the framework of preventive or corrective maintenance (Article 2(17) of Directive (EU) 2016/797)
Upgrading	Any major modification work on a subsystem or part of it which results in a change in the technical file accompanying the 'EC' declaration of verification, if that technical file exists, and which improves the overall performance of the subsystem (Article 2(14) of Directive (EU) 2016/797)

Table 3: Abbreviations

ABBREVIATION	FULL TEXT
CEN	European Committee for Standardisation
CR	Conventional Rail
DeBo	Designated Body
EC	European Commission
EN	European standard
ERA	European Union Agency for Railways also called “the Agency”
ERADIS	Interoperability and Safety database managed by the European Union Agency for railways
ERATV	European Register of Authorised Types of Vehicles
EU	European Union
IC	Interoperability Constituent
IM	Infrastructure Manager
INF	Infrastructure
ISO	International Organisation for Standardisation
ISV	Intermediate Statement Verification
MS	EU or EEA Member State
NoBo	Notified Body
NSA	National Safety Authority
OJ	Official Journal of the European Union
PRM	Person with Disabilities or Person with Reduced Mobility
RAMS	Reliability, Availability, Maintainability and Safety
RINF	Register of Infrastructure
RID	Regulations concerning the International Carriage of Dangerous Goods. These regulations are mandated in Annex II of Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008 on the inland transport of dangerous goods
RS	Rolling Stock
RU	Railway Undertaking
SC	Standard Committee
SRT	Safety in Railway Tunnels
TC	Technical Committee
TR	Technical Report
TS	Technical Specification
TSI	Technical Specification for Interoperability
UIC	International Union of Railways (Union Internationale des Chemins de Fer)
WG	Working Group
WP	Working Party

Definitions and abbreviations within the meaning of COTIF are provided in Article 2 of the APTU UR (Appendix G to COTIF) and Article 2 of the ATMF UR (Appendix G to COTIF), as well as in the UTPs referred to throughout this application guide.

COTIF applies to international rail traffic only and consequently the UTP WAG applies only to vehicles for use in international traffic.

Contracting States may also decide to apply the UTP WAG for the purpose of domestic traffic. Such application would not fall within the scope of COTIF.

~~. The line or network a vehicle runs on is not a parameter relating to the scope of application of the UTP WAG.~~

~~All freight wagons, which are in full compliance with the UTP WAG provisions are suitable to be admitted to international traffic under the ATMF uniform rules.~~

2. GUIDANCE ON THE APPLICATION OF THE WAG TSI

UTP Section 0: Equivalence and transitional provisions

The UTP WAG is equivalent to the EU ~~regulations~~ WAG TSI in the meaning of Article 13 § 4 letter b of the APTU UR. This means that, in technical terms, compliance with the requirements of the UTP should be considered as compliance with the requirements of the TSI and vice versa. Contracting States should not therefore require reassessment of conformity of parameters that have been assessed according to either the TSI or the UTP for the purpose of accepting a vehicle to international traffic on their territory.~~relating to freight wagons, in particular:~~

- ~~The WAG TSI, and~~
- ~~the marking of freight wagons as set out in appendix PP, in line with EU NVR Specification (Decision 2007/756/EU, as amended by Decision 2012/757/EU)~~

~~In addition it covers:~~

- ~~Vehicle parameters relating to train detection as set out in appendix H, in line with the CCS TSI, and~~
- ~~Operational parameters relating to the safe and correct use of wagons as set out in appendix I, in line with the OPE TSI.~~

~~A wagon that complies with all mandatory requirements in the UTP and with the optional additional conditions set out in section 7.1.2 and which is admitted to operation in one of the OTIF Contracting States will automatically be admitted to operation in all other Contracting States. The legal basis for this is set out in ATMF Articles 3a § 2 and 6 § 3. This principle is referred to as "free circulation" and also applies to all EU Member States which are also OTIF Contracting States.~~

~~In accordance with ATMF Article 3a § 1, freight wagons "authorised for placing into service" in an EU Member State in conformity with the WAG TSI, section 7.1.2 (including the related markings), are also admitted to operation in all non-EU Contracting States.).~~

2.1 Scope and definition of the subsystem

COTIF applies to international rail traffic only. Therefore, any rolling stock used in international traffic on the territory of states that apply the ATMF UR falls within the scope of the UTP.

2.1.1 Sections 2.1: Scope and 7.1: Authorisation for placing on the market

The other vehicles listed in Section 2 of Annex I to Directive (EU) 2016/797 are excluded from the scope of this TSI; this is especially the case for:

- *(a) mobile railway infrastructure construction and maintenance equipment*
- *(b) vehicles designed to carry:*
  - *motor vehicles with their passengers on board, or*
  - *motor vehicles without passengers on board but intended to be integrated in passenger trains (car carriers)*
- *(c) vehicles which*
  - *increase their length in loaded configuration and*
  - *their payload itself is part of the vehicle structure.*

Note: See also section 7.1 for particular cases.

This TSI is applicable to the subsystem 'rolling stock — freight wagons' within the scope set out in its Sections 1.1, 1.2 and 2.1, which are placed in service after the date of application of this TSI. This TSI is also applicable on a voluntary basis to:

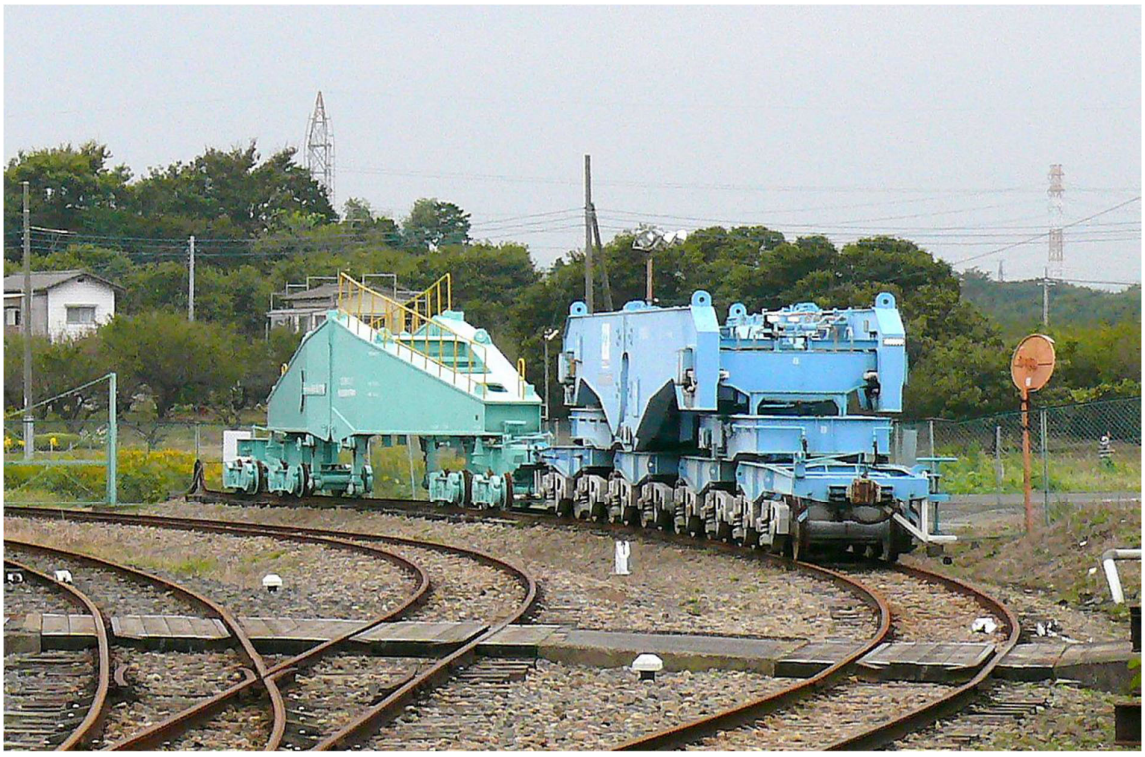
- *units referred to in section 2.1 point (a) in transport (running) configuration, in case they correspond to a 'unit' as defined in this TSI, and*
- *units as defined in section 2.1 point (c), in case they are in empty configuration.*

In case the applicant chooses to apply this TSI, the corresponding EC declaration of verification shall be recognised as such by Member States.

In case of OTMs in transport (running) configuration, if the applicant chooses to apply the TSI, he can apply either the WAG TSI or the LOC&PAS TSI for conformity assessment; a vehicle may be assessed under either of the TSIs depending on the characteristics and the intended use of the vehicle in question in comparison with the technical scope of the respective TSIs. In case the applicant chooses not to apply the TSIs, the applicant still needs to apply the procedure for authorisation set out in Regulation 2018/545.

Figure 1: Example of a vehicle that increases its length in loaded configuration and its payload is part of the vehicle structure (in loaded configuration)

Figure 2: Two examples of vehicles that increase their length in loaded configuration and their payload is part of the vehicle structure (in unloaded configuration)



2.1.2 Section 2.2: Definitions

(a) *A 'unit' is the generic term used to name the rolling stock. It is subject to the application of this TSI, and therefore subject to the EC verification procedure.*

A unit can consist of:

- *a 'wagon' that can be operated separately, featuring an individual frame mounted on its own set of wheels, or*
- *a rake of permanently connected 'elements', those elements cannot be operated separately, or*
- *'separate rail bogies connected to compatible road vehicle(s)' the combination of which forms a rake of a rail compatible system.*

The following Figures 3, 4, 5, 6, 7 and 8 clarify these definitions.

Figure 3: Example of a unit consisting of a (freight) wagon that can be operated separately, featuring an individual frame mounted on its own set of wheels

Figure 4: Example 1 of a unit consisting of a rake of permanently connected two elements (blue and orange), those elements cannot be operated separately (articulated wagon)

Figure 5: Example 2 of a unit consisting of a rake of permanently connected two elements; those elements cannot be operated separately

Figure 6: Example 3 of a unit consisting of a rake of permanently connected elements, those elements cannot be operated separately (self-discharging train)

Figure 7: Example 1 of a unit consisting of separate rail bogies connected to compatible road vehicles

Figure 8: Example 2 of a unit consisting of separate rail bogies connected to compatible road vehicles

2.2 Essential requirements

The essential requirements 1.3.1, 1.4.1, 1.4.3, 1.4.4 and 1.4.5 of Annex III of the Directive (EU) 2016/797 fall under the scope of other Union legislation.

"The essential requirements 1.3.1, 1.4.1, 1.4.3 and 1.4.5 of UTP GEN-A may fall under the scope of other legislation applicable in the Contracting State. ~~The application of the present UTP does not ensure full compliance with these essential requirements.~~"

In accordance with UTP GEN-D, at the first (and, if applicable, consecutive) admission to operation, the Contracting State must take all appropriate steps to ensure that the wagon is designed and constructed in such way that it meets the essential requirements when integrated into the rail system.

If neither the UTP nor the notified national rules provide an adequate basis for full assessment of compliance with the essential requirements, an explicit risk assessment and evaluation in accordance with UTP GEN-G must be performed.

The following essential requirements have not been dealt with at all within the drafting process of the WAG TSI because they are in the scope of other mandatory EU legislation:

1.3.1 Materials likely, by virtue of the way they are used, to constitute a health hazard to those having access to them must not be used in trains and railway infrastructures. (Directive 2006/42/EC on machinery)

1.4.1 The environmental impact of establishment and operation of the rail system must be assessed and taken into account at the design stage of the system in accordance with the Community provisions in force. (Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment and Directive 2008/68/EC on the inland transport of dangerous goods)

1.4.3 The rolling stock and energy-supply systems must be designed and manufactured in such a way as to be electromagnetically compatible with the installations, equipment and public or private networks with which they might interfere. (Directive 2014/30/EU on the harmonisation of the laws of the Member States relating to electromagnetic compatibility)

This essential requirement is complied with if the inherent nature of the physical characteristics of a wagon is such that it is incapable of generating or contributing to electromagnetic emissions which exceed a level allowing radio and telecommunication equipment and other equipment to operate as intended; and it will operate without unacceptable degradation in the presence of the electromagnetic disturbance normally consequent upon its intended use.

1.4.4 The design and operation of the rail system must not lead to an inadmissible level of noise generated by it:

— in areas close to railway infrastructure, as defined in Article 3 of Directive 2012/34/EU, and

— in the driver's cab. (Commission Regulation (EU) No 1304/2014 on the technical specification for interoperability relating to the subsystem 'rolling stock – noise')

COTIF ~~noise regulations equivalent to~~requirements equivalent to Regulation (EU) No 1304/2014~~2011/229/EU~~ are set out in the UTP Noise~~OI, reference A 94-04/2.2012~~.

1.4.5 Operation *of the rail system must not give rise to an inadmissible level of ground vibrations for the activities and areas close to the infrastructure and in a normal state of maintenance*. (Directive 2002/44/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration))

Ensuring compliance with this essential requirement, ~~beyond the specifications set out in the UTP WAG and UTP NOI, i~~may~~s~~ required measures~~–~~ at the level of fixed installations such as railway infrastructure and its surroundings. Compliance with the UTP WAG and UTP NOI are sufficient at the level of rolling stock. Contracting States should not impose additional requirements on rolling stock for this essential requirement.

2.3 Characterisation of the subsystem

2.3.1 Section 4.1: Introduction

The rail system, to which the Directive (EU) 2016/797 applies and of which freight wagons form a part, is an integrated system whose consistency shall be verified. This consistency shall be checked in particular with regard to the specifications of the rolling stock subsystem and the compatibility with the network (section 4.2), its interfaces in relation to the other subsystems of the rail system in which it is integrated (sections 4.2 and 4.3), as well as the initial operating and maintenance rules (sections 4.4 and 4.5) as requested by Article 18(3) of Directive (EU) 2016/797.

The technical file, as set out in Article 18(3) and Annex VI to Directive (EU) 2016/797 (section 4.8), shall contain in particular design related values concerning the compatibility with the network.

The WAG TSI covers the harmonisation of all subsystem-related

- basic parameters necessary to achieve interoperability and safe integration including the
- basic parameters needed for the RU to establish together with the IM the compatibility of a unit with the network.

The WAG TSI sets out in addition how the values of the compatibility relevant basic parameters must be determined (calculation method, tests, simulations). Concerning the safe integration the applicant has to compile the initial documentation containing in particular all the elements relating to the conditions and limits of use and to the instructions concerning servicing, constant or routine monitoring, adjustment and maintenance. This documentation has to accompany the unit and enables the RUs to take their responsibility concerning the safe operation as per Article 4.1(d) of the Railway Safety Directive (Directive (EU) 2016/798) and the OPE TSI.

Safe operation is not covered by COTIF requirements in the scope of the APTU or ATMF UR. This means that the safety of operation in international traffic relies on the rules applicable in the state concerned, including EU law for states that apply it.

Nevertheless, in order to avoid the need to re-check train compositions at borders and in order to ensure a harmonised approach to route compatibility checks, ~~Appendix I of t~~the UTP concerning train composition and route compatibility checks (UTP TCRC) sets out requirements~~provisions~~ and responsibilities relating to the safe and correct use of wagons. These ~~principles~~ provisions are ~~equivalent to~~based on the European Union provisions in the OPE TSI and the European Union's specifications for the register of infrastructure (RINF) relating to this subject.~~Wagons are commonly exchanged between railway undertakings. The ECM of each wagon remains the same during such exchanges. It is imperative that each operating railway undertaking exchanges information with the ECM about the use and possible restrictions relating to each wagon.~~

The process of establishing the compatibility with infrastructure may be centralised, performed once giving restrictions of use line per line, or performed for each time slot allocated by the infrastructure manager. Whichever is the case, the railway undertaking has to control that all the wagons in its train composition are capable and suitable of going on the line the train is slotted for in respect of loading (axle load), loading gauge, brake performance (brake weight), etc.

2.3.2 Point 4.2.1 General

In light of the essential requirements in Chapter 3, the functional and technical specifications of the subsystem 'rolling stock — freight wagons' are grouped and sorted out in the following points of this Chapter:

— *Structures and mechanical parts*

— *Gauging and vehicle track interaction*
— *Brake*
— *Environmental conditions*
— *System protection.*

Except where this is strictly necessary for the interoperability of the rail system and to meet the relevant essential requirements, the functional and technical specifications of the freight wagon and its interfaces do not impose the use of any particular technical solutions.

[…]

Measures to ensure that the load do not leave the freight wagon are not covered by this TSI. The TSI is not intended to be a design guide including good practice and advice; this type of requirements belongs to the people who are professional freight forwarders. Therefore not any load securing requirements are considered in the TSI, including design hints for the doors, specific requirements for the attachment of Semi-Trailers to Railcar Trailer, side and end walls such as these "shall be designed to carry the maximum load they will experience in performing their intended function".

2.3.3 Point 4.2.2.1.1: End coupling and point 4.2.2.1.2: Inner coupling

End couplings shall be resilient and capable of withstanding the forces in accordance with the defined design operating state of the unit.

The inner coupling shall be resilient and capable of withstanding the forces in accordance with the defined design operating state of the unit. The joint between two elements sharing the same running gear, is covered by point 4.2.2.2.

The longitudinal strength of the inner coupling(s) shall be equal to or higher than the one of the end coupling(s) of the unit.

The input parameters coming from the intended operation of the wagon (e.g. train weight, acceleration/deceleration of the train, etc.) determines the load (dynamic traction and compressive forces, etc.) the coupling must be designed for. The longitudinal direction is to be taken as the travel direction of the train.

2.3.4 Point 4.2.2.2: Strength of unit

The structure of a unit body, any equipment attachments and lifting and jacking points shall be designed such that no cracks, no significant permanent deformation or ruptures occur under the load cases defined in Chapter 5 of EN 12663-2:2010.

In case of a rake of a rail compatible system composed of separate rail bogies connected to compatible road vehicles, the load cases may differ from those mentioned above, due to their bi-modal specification; in such a case, the load cases considered shall be described by the applicant based on a consistent set of specifications with consideration of the specific conditions of use related to train composition, shunting and operation.

'Equipment attachments' include loading devices.

In case of a rake of a rail compatible system composed of separate rail bogies connected to compatible road vehicles, the road vehicles are also subject to the requirements of point 4.2.2.2.

For tank wagons which fall under the scope of point 6.8.2.1.2 of RID, the following is to be taken into account in the load cases to assess the strength of the wagon:

(1) The maximum working pressure of the tank has been superimposed on the load cases

(2) The operating temperature range of the shell and

(3) The minimum wall thickness of the shell in accordance to RID 6.8.2.1 and 6.8.2.6.

2.3.5 Point 4.2.3.1: Gauging

The compliance of a unit with the intended reference profile including the reference profile for the lower part shall be established by one of the methods set out in EN 15273-2:2013+A1:2016. The kinematic method, as described in EN 15273-2:2013+A1:2016 shall be used to establish conformity, if any, between the reference profile established for the unit and the respective target reference profiles G1, GA, GB and GC including those used for the lower part GI1 and GI2.

The compliance with the requirements is used by the RU for the establishment of the compatibility with the structure gauge of the infrastructure.

This compliance shall be demonstrated in any case, not only for the interoperable gauges.

Furthermore the EN 15273-2 contains requirements on the minimum vertical convex / concave curve radius capability which have to be registered in ERATV as these are a basic design characteristic and part of the route compatibility check.

There is no OTIF register equivalent to the European register of authorised types of vehicles (ERATV). Basic design characteristics should therefore be recorded in the technical file (**UTP GEN-C**). The information contained in the technical file should be used by the RU when applying the UTP TCRC.

2.3.6 Point 4.2.3.3: Compatibility with train detection systems

If the unit is intended to be compatible with one or more of the following train detection systems, this compatibility shall be established according to the provisions of the ERA/ERTMS/033281 rev. 4.0.

(a) Train detection systems based on track circuits.

(b) Train detection systems based on axle counters.

(c) Train detection systems based on loop equipment.

The set of parameters in order to be compatible with train detection systems, such as track circuits, axle counters and loop systems, have been identified in the TSI with references to the CCS TSI for each parameter and type of train detection system.

Based on ERA document ERA/ERTMS/033281 rev. 4.0, **Appendix H** of the UTP WAG sets out the requirements that wagons must meet in order to ensure compatibility with train detection systems. The parameters for train detection systems listed under letters a), b) and c) are basic design characteristics and as such, must be recorded in the technical file (see **UTP GEN-C**).

The TSI requirement for rolling stock regarding compatibility with CCS TSI is that the train detection system(s) which the rolling stock has been assessed as being compatible with is (are) declared and recorded in the technical documentation.

Rolling stock is permitted to be non-compatible with any TSI specification relating to this clause.

In case the compatibility with the existing train detection systems is not covered by the TSI requirements above, this should be checked at MS level in accordance with the notified national rules by a designated body appointed by the MS. This verification is not in the scope of the TSIs, but is part of the

authorisation for placing in service; its result will be indicated in the ERATV by means of reference to these national rules.

If the brake system requires friction elements for wheel tread brakes, compliance with chapter 7 of ERA technical document ERA/TD/2013-02/INT published on the ERA website (http://www.era.europa.eu) fulfils the requirements on compatibility with train detection systems based on track circuits set out in ERA/ERTMS/033281 rev. 3.0 for use of composite brake blocks.

Appendix O of the UTP WAG sets out the requirements that friction elements for wheel tread brakes must meet in order to be compatible with train detection systems. It is based on ERA technical document ERA/TD/2013-02/INT version 3.0 of 27.11.2015 published on the ERA website (http://www.era.europa.eu).

2.3.7 Point 4.2.3.4: Axle bearing condition monitoring

If the unit is intended to be capable of being monitored by on-board equipment, the following requirements shall apply:

- *This equipment shall be able to detect a deterioration of any of the axle box bearings of the unit.*
- *The bearing condition shall be evaluated either by monitoring its temperature, or its dynamic frequencies or some other suitable bearing condition characteristic.*
- *The detection system shall be located entirely on board the unit, and diagnosis messages shall be available on board the unit.*
- *The diagnosis messages delivered and how they are made available shall be described in the operating documentation set out in section 4.4 of this TSI, and in the maintenance rules described in section 4.5 of this TSI.*

Some technical solutions complying with the requirements of this point are:

- Train bus including the locomotive and other units forming a train
- Radio communication to an operational centre that may send the received messages to the driver by radio (similarly to what is done currently with fixed detection systems)
- Fusible plug
- Other solutions

2.3.8 Points 4.2.3.5.2, 6.1.2.1 and 6.2.2.3: Running dynamic behaviour/Running gear

The running dynamic behaviour of a unit shall be proven either by

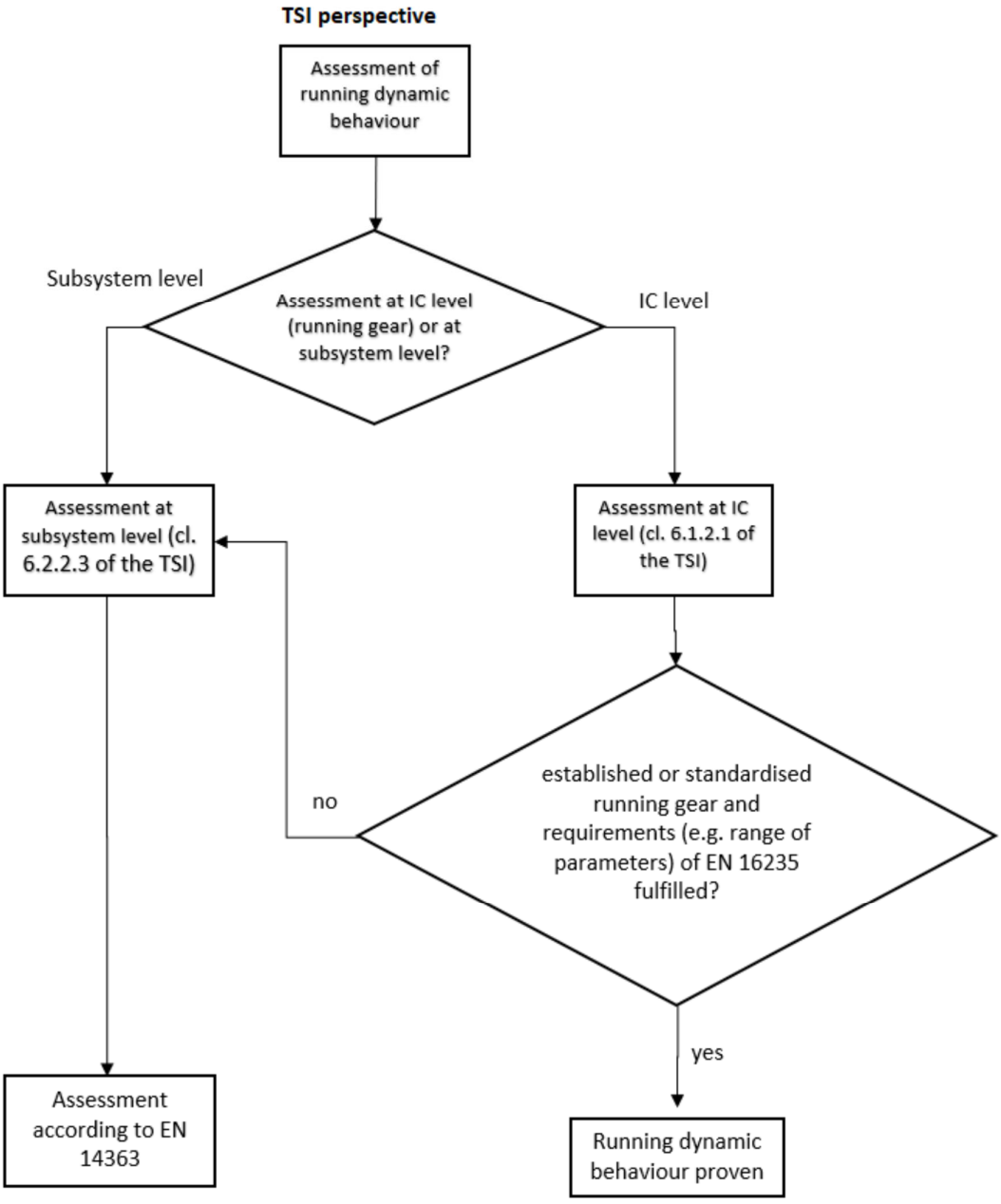
- *following the procedures set out in chapters 4, 5 and 7 of EN 14363:2016, or*
- *performing simulations using a validated model.*

The demonstration of conformity is described in point 6.2.2.3.

Running dynamic behaviour is permitted to be assessed at interoperability constituent level in accordance with point 6.1.2.1. In this case a specific test or simulation at subsystem level is not required.

The TSI sets out several possibilities to verify the running capability of a wagon as set out in **Figure 9**.

Figure 9: Flow chart of all the possibilities to prove the running dynamic behaviour in the TSI



The demonstration of conformity shall be carried out in accordance with chapters 4, 5 and 7 of EN 14363:2016.

EN 14363:2016 applies to vehicles intended for circulation on 1435 mm track gauge networks; however, it is permissible to apply this standard by analogy for vehicles intended for circulation on other track gauges. The related test conditions and limit values are specified in this TSI.

The combination of the highest equivalent conicity and speed for which the unit meets the stability criterion in chapters 4, 5 and 7 of EN 14363:2016 shall be recorded in the report.

The recorded combination of the highest equivalent conicity and speed enables the implementation of operational measures where necessary due to infrastructure characteristics.

2.3.9 Points 4.2.3.6.2 and 6.1.2.2: Characteristics of wheelsets

The demonstration of conformity for the mechanical behaviour of the wheelset assembly shall be carried out according to clause 3.2.1 of EN 13260:2009+A1:2010, which defines limit values for the axial assembly force and the associated verification test.

The requirement of the wheelset mechanical behaviour of the assembly as expressed in the TSI is intended to ensure the ability of 'transmitting the forces and a torque between the fitted elements' as stated in clause 3.2.1 of EN 13260:2009+A1:2010.

2.3.10 Points 4.2.3.6.3 and 6.1.2.3: Characteristics of wheels

The mechanical characteristics of the wheels shall ensure the transmission of forces and torque as well as the resistance against thermal load where so required in accordance with the area of use.

(a) ...

If the wheel is intended to be used with brake blocks acting on the wheel running surface, the wheel shall be thermo–mechanically proven by taking into account the maximum braking energy foreseen.

According to the mentioned clauses, the wheel is required to be resistant against thermal effects - requirements on thermal aspects of the interoperability constituent 'wheel' are herewith specified and assessment is performed according to point 6.1.2.3. Furthermore, in accordance with point 4.2.4.3.3, the brake equipment is required to be able to withstand one emergency brake application without any loss of brake performance due to thermal effects - requirements on thermal aspects of the brake at the level of the subsystem are therefore defined and assessment is performed according to point 6.2.2.6.

ERA technical document ERA/TD/2013-02/INT additionally specifies in chapter 9 the voluntary performance of a 'locked brake test' of a friction element for wheel tread brakes (according to EN 16452:2015).

Appendix O of the UTP WAG reproduces the requirements of ERA technical document ERA/TD/2013-02/INT version 3.0 of 27.11.2015 published on the ERA website (http://www.era.europa.eu)

The objective of this test is to determine from the temperature of a wheel tread measured after being braked by defined brake force during defined time the conformity/non-conformity of the friction element. This test represents a possibility for the friction element manufacturer to test thermal aspects of the friction element in addition to the mandatory verification, as specified in the previous paragraph, of thermal aspects of wheels (by the wheels manufacturer) and the brake system of the wagon (by the applicant). If the manufacturer of the friction element decides to perform this additional test, he has to record the evidence of it in the technical documentation as part of the area of use.

(a) Forged and rolled wheels: The mechanical characteristics shall be proven following the procedure as specified in clause 7 of EN 13979-1:2003+A1:2009+A2:2011.

The wheel is required to be designed following the methodology set out in clause 7 of EN 13979-1:2003+A1:2009+A2:2011, which requires calculations to be performed and subsequent tests if design criteria are not met.

For tread braked wheels the requirements of clause 6.2.1 of EN 13979-1:2003+A1:2009+A2:2011 are fulfilled only by using the values of Table C.4.

The design criteria, the permissible range of dynamic stress, are defined for forged and rolled wheels. The test to be performed in case of exceeding the criteria is a bench test where it is required that no fatigue cracks must be observed after the test.

(a) ...

The decision criteria of residual stresses for forged and rolled wheels are set out in EN 13979-1:2003+A1:2009+A2:2011.

The decision criteria of the thermo mechanical behaviour of wheels for materials other than ER6 and ER7 which are presented in EN 13979-1:2003+A1:2009+A2:2011 have to be extrapolated from known data. Furthermore, any other type of wheel than those set out in the TSI, are permitted for (and restricted to) national use.

A verification procedure shall exist to ensure at the production phase that no defects may adversely affect safety due to any change in the mechanical characteristics of the wheels.

The wheel is a component, which needs to be checked and controlled, not only for the design criteria, but also for ensuring end quality of the product. EN 13262:2004+A1:2008+A2:2011 sets out the verification procedure to be followed for the parameters stated in the TSI; the material characteristics and the number of samples to be checked in production, the procedures to follow for any changes in the design of the axle or changes of manufacturer of the material of the axle, etc.

The verification of the fatigue characteristics of the wheel material, as set out in the TSI, is only intended to be performed if there is a change of supplier of the raw material for the production of the wheel or there are any changes to the manufacturing process or the design of the wheel is appreciably changed.

2.3.11 Points 4.2.3.6.4 and 6.1.2.4: Characteristics of axles

In addition to the requirement on the assembly above, the demonstration of conformity of the mechanical resistance and fatigue characteristics of the axle shall be based on Clauses 4, 5 and 6 of EN13103:2009 + A2:2012.

The decision criteria for the permissible stress are specified in Clause 7 of EN EN13103:2009 + A2:2012.

The verification of the axle is supposed to be done by calculation as set out in EN 13103:2009+A2:2012 which defines the load cases to consider, the specific calculation methods for the design of the axle and the decision criteria, the permissible stress, for steel grade EA1N and the methodology for arriving to permissible stress with other materials.

A verification procedure shall exist to ensure at the production phase that no defects may adversely affect safety due to any change in the mechanical characteristics of the axles. The tensile strength of the material in the axle, the resistance to impact, the surface integrity, the material characteristics and the material cleanliness shall be verified. The verification procedure shall specify the batch sampling used for each characteristic to be verified.

The axle is a component, which needs to be checked and controlled, not only for the design criteria, but also for ensuring end quality of the product. EN 13261:2009+A1:2010 sets out the verification procedure to be followed for the parameters stated in the TSI; the number of samples to be checked in production, the procedures to follow for any changes in the design of the axle or changes of manufacturer of the material of the axle, etc.

2.3.12 Points 4.2.3.6.5 and 6.2.2.4: Axle boxes/bearings

The axle box and the rolling bearing shall be designed with consideration of mechanical resistance and fatigue characteristics.
The demonstration of conformity for mechanical resistance and fatigue characteristics of the rolling bearing shall be in accordance with clause 6 of EN 12082:2007+A1:2010.

Clause 6 of EN 12082:2007+A1:2010 consists of a rig test for an assembly composed of axle box housing, rolling bearing(s), sealing and grease.

A suitable demonstration of conformity for the axle box assembly may be performed by the applicant and checked by the notified body.

It is permitted to use other standards for the above demonstration of conformity where the EN standards do not cover the proposed technical solution; in that case the notified body shall verify that the alternative standards form part of a technically consistent set of standards applicable to the design, construction and testing of the bearings.

The paragraph above is also applicable in cases where the assembly does not have an axle box.

2.3.13 Points 4.2.3.6.6, 6.1.2.6 and 6.2.2.4a: Automatic variable gauge systems

The failure of the locking of the position of the wheels and braking equipment (if relevant) during operation has typical credible potential to lead directly to a catastrophic accident (resulting in multiple fatalities); considering this severity of the failure consequence, it shall be demonstrated that the risk is controlled to an acceptable level.
The safety analysis required in point 4.2.3.6.6, and performed at IC level, shall be consolidated at the level of the unit; in particular, the assumptions made in accordance with point 6.1.2.6 may need to be reviewed to take into account the unit and its mission profile.

The latest revision of the common safety method for risk evaluation and assessment (Commission Implementing Regulation (EU) 402/2013) clarifies in point 2.5.6 of its Annex I that the harmonised design targets needed to apply the 'explicit risk estimation and evaluation' cannot be used neither for purely mechanical systems nor for purely mechanical part of mixed systems.

COTIF provisions equivalent to Commission Implementing Regulation (EU) 402/2013 are set out in the UTP GEN-G.

Taking into account that the safety target is fixed in the TSI for the locking of the position of the wheels and braking equipment in the variable gauge system, as long as this system is

- purely mechanical or
- composed of both a purely mechanical part and an electrical, electronic and programmable electronic part

a safety demonstration referred to in points 4.2.3.6.6, 6.1.2.6 and 6.2.2.4a of the TSI should use as risk acceptance principles 'codes of practice' or 'similar reference systems'. This means that the manufacturer will have to compare the proposed solution to similar existing ones (e.g. mechanical systems subject to similar forces); a risk analysis based on 'explicit risk estimation and evaluation' should not be acceptable for the purely mechanical part.

The existing codes of practice for the validation of these systems are:

- EN 17069-1:2019 'Railway applications - Systems and procedures for change of track gauge'
- National rules (e.g. Annex G of ETH de Material Rodante Ferroviario. Vagones, DGF-MFOM, 2009 – Spanish Technical Rule)

Existing systems already in service can be referred to as reference systems.

The automatic variable gauge system may be subject to an assessment of suitability for use (module CV). Before commencing in-service tests, a suitable module (CB or CH1) shall be used to certify the design of the interoperability constituent. The in-service tests shall be organised on request from the manufacturer, who must obtain an agreement from a railway undertaking for its contribution to such assessment.

The manufacturer has the ultimate responsibility to meeting all the essential requirements applicable to automatic variable gauge system. The WAG TSI further specifies mandatory in-service testing if there is insufficient return of experience for the proposed design of the system. The notion of return of experience is to be understood in this context. The manufacturer is the best placed actor to decide (under his sole responsibility) on its own maturity taking into account the area of use of the automatic variable gauge system on the one hand and the previous experience with similar types of systems on the other hand. The safety analysis required in point 4.2.3.6.6 may be used for this purpose.

According to Decision 2010/713/EU, it is the manufacturer who defines the programme for validation of an automatic variable gauge system by in-service experience using module CV. The on-track tests described in EN 17069-1:2019 'Railway applications - Systems and procedures for change of track gauge' may be taken as reference. The provisions of this draft standard may be altered by the manufacturer taken into account the area of use of the automatic variable gauge system and the level of experience that the manufacturer possesses with similar designs of this equipment. The objective of in-service testing is to perform the tests under real conditions and tailored to match the area of use of the automatic variable gauge system.

COTIF provisions equivalent to Decision 2010/713/EU are set out in the UTP GEN-D.

2.3.14 Points 4.2.3.6.7 and 6.2.2.5: Running gear for manual change of wheelsets

Changeover between 1 435 mm and 1 668 mm track gauges The technical solutions described in the following figures of the UIC leaflet 430-1:2012 are deemed to be compliant with the requirements in point 4.2.3.6.7:

- *for axle units: Figures 9 and 10 of Annex B.4, and Figure 18 of Annex H of UIC leaflet 430-1:2012,*
- *for bogie units: Figure 18 of Annex H and Figures 19 and 20 of Annex I of UIC leaflet 430-1:2012.*

Changeover between 1 435 mm and 1 524 mm track gauges.

The technical solution described in Appendix 7 of UIC leaflet 430-3:1995 is deemed to be compliant with the requirements in point 4.2.3.6.7.

At the present time, only one approach for the manual change of wheelsets exists. The requirements concerning the interface between the unit and the current facilities carrying out the manual change of wheelsets can be found in UIC leaflet 430-1:2012 (1 435 mm/1 668 mm) and in UIC leaflet 430-3:1995 (1 435 mm/1 524 mm).

Should alternatives become available these will be addressed within the revision of this Application Guide.

2.3.15 Point 4.2.4.2: Brake - Safety requirements

The braking system contributes to the safety level of the railway system. Therefore the design of the braking system of a unit has to undergo a risk assessment in accordance with Commission Implementing Regulation (EU) No 402/2013 considering the hazard of complete loss of the brake capability of the unit. The severity level shall be deemed as catastrophic when:

- *it affects the unit alone (combination of failures), or*
- *it affects the brake capability of more than the unit (single fault).*

The fulfilment of the conditions of C.9 and C.14 of Appendix C is presumed to be in conformity with this requirement.

The brake system contributes significantly to the safety level of the railway system. Therefore, point 4.2.4.2 of the TSI requires a risk assessment in accordance with Commission Implementing Regulation (EU) No 402/2013 on risk evaluation and assessment (CSM regulation).

COTIF provisions~~regulations~~ equivalent to Commission Implementing Regulation (EU~~C~~) ~~No 352/2009~~ 402/2013 are set out in the UTP GEN-G~~, reference A-94-01G/1.2012~~.

The risk assessment is based on the following commonly accepted risk acceptance principles:

- the application of codes of practice and risk evaluation, and/or
- use of reference system and risk evaluation, and/or
- an explicit risk estimation and evaluation.

The applicant/proposer may choose which of the principles he wants to apply.

The hazard to be covered by this risk assessment is the complete loss of the brake capability of the unit. The following two scenarios are required to be controlled:

1. The failure or combination of failures is affecting only the brake capability of the unit itself.
2. One single failure leads to a loss of the brake capability of another unit or of other units in a train.

Both scenarios are allocated to the severity level ‘catastrophic’ which means that the associated risk does not have to be reduced further if the rate of that failure or combination of failures is less than or equal to 10^{-9} per operating hour. All failures and the causes which may lead to one of these scenarios are to be analysed and identified.

The CSM regulation in its Article 15(1) obliges the assessment body to provide the applicant/proposer with a safety assessment report which must contain e.g. all made assumptions.

The applicant has to record in the technical file all corresponding operating and maintenance rules which shall be met (see section 4.4 and 4.5 of the TSI) in order to control the given scenarios. This information enables the RUs and ECMs to take their responsibility in accordance with Article 4(3) of the Railway Safety Directive (Directive (EU) 2016/798).

Articles 15 and 15a of the ATMF UR set out provisions concerning mutual responsibilities and obligations between RUs, Keepers, IMs and ECMs.

One possibility to carry out the risk assessment can be the application of a code of practise, such as the CENELEC standards EN 50126-1:1999/AC:2012, EN 50128:2011/AC:2014 and EN 50129:2003/corrigendum May 2010, or some others, including the compliance with their applicable ‘reliability, availability maintainability and safety (RAMS)’ requirements. In this case, the corresponding RAMS performance must be recorded in the technical file as well.

The Brake block

The brake block (i.e. friction element for wheel tread brakes) is a part of the brake system and is assessed together with it. Therefore, the proposer/applicant has to follow the CSM approach also for the brake block. The corresponding codes of practise should be considered as applied if brake blocks:

- are part of those listed in Appendix G of the TSI, or
- fulfil the requirements set out in point 4.2.4.3.5 and are assessed in accordance with the procedure set out in point 6.1.2.5 of the TSI, or
- are part of those listed in Appendix M of UIC leaflet 541-4:2010, or
- other agreed publicly available codes of practice for wagons restricted to national use only.

2.3.16 Point 4.2.4.3.2: Brake - Brake performance

The brake performance of a unit shall be calculated in accordance with one of the following documents:

- *EN 14531-6:2009, or*
- *UIC 544-1:2014.*

The calculation shall be validated by tests. Brake performance calculation in accordance with UIC 544-1 shall be validated as set out in UIC 544-1:2014.

A brake performance calculation performed in accordance with the UIC leaflet 544-1:2014 has to be validated as set out in the UIC leaflet. The UIC leaflet describes some exemptions, for which tests are not always necessary[1].

2.3.17 Point 4.2.4.3.3: Brake - Thermal capacity

The braking equipment shall be able to withstand one emergency brake application without any loss of brake performance due to thermal or mechanical effects.

The essential requirement is fulfilled as soon as the wagon complies with this requirement. The operative rules, depending on the design of the wagon, have to set out how to continue following a standstill after an emergency brake application. It could be necessary to check the brake equipment or to take time restrictions into account before the train is allowed to continue its journey (risk: immediate second emergency brake).

This requirement on thermal aspects of the brake equipment is defined at the level of the subsystem. It means that if the brake system requires friction elements for wheel tread brakes, the friction elements are required to comply because they are part of the brake.

The thermal load that the unit is capable of withstanding without any adverse loss of brake performance due to thermal or mechanical effects, shall be defined and expressed in terms of speed, axle load, gradient and brake distance.

This thermal load should be consistent with the resistance against thermal load of the wheel as set out in point 4.2.3.6.3.

[1] The UIC leaflet refers also to the document 'Design rules of composite (k) brake blocks' where describes more exemptions, therefore for which tests are not necessary.

A slope of 21 ‰ at 70 km/h during 40 km may be considered as the reference case for the thermal capacity which results in a braking power of 45 kW per wheel during 34 minutes for a nominal wheel diameter of 920 mm and an axle load of 22,5 t.

The requirement allows for any thermal capacity of the brake equipment. The reference case sets out a combination of values considered representative for a major part of the European network. The fulfilment of the brake components with the reference case is to be recorded in the technical file and in ERATV.

Because the brake – thermal capacity is a basic design characteristic, it must be recorded in the technical file (**UTP GEN-C**). The technical file should be used by the RU when applying the UTP TCRC.

2.3.18 Point 4.2.4.3.4: Brake - Wheel slide protection

The following types of units shall be fitted with WSP:

- *types of units equipped with all types of brake blocks except composite brake blocks, for which the maximum mean utilisation of adhesion is greater than 0,12,*
- *types of units equipped with brake discs only and/or with composite brake blocks, for which the maximum mean utilisation of adhesion is greater than 0,11.*

The maximum mean utilisation of adhesion is the maximum mean utilisation of adhesion after response time (in accordance with clause 4.4.5 of EN 14478:2005) considering the speed range between 30 km/h and maximum intended operating speed of the wagon.

For wagons fulfilling the TSI including section 9 of Appendix C and with a maximum braking performance not exceeding a brake percentage calculated in accordance with UIC 544-1:2014 of

- 125%, or
- 130% for empty wagons as defined in Table C.3 of Appendix C,

the requirement is deemed to be fulfilled without WSP.

2.3.19 Points 4.2.4.3.5 and 6.1.2.5: Friction elements for wheel tread brakes

The demonstration of conformity of friction elements for wheel tread brakes shall be carried out by determining the following friction element properties in accordance with ERA technical document ERA/TD/2013-02/INT version 3.0 of 27.11.2015 published on the ERA website (http://www.era.europa.eu):

- *dynamic friction performance (chapter 4);*
- *static friction coefficient (chapter 5);*
- *mechanical characteristics including properties in respect with shear strength test and flexural strength test (chapter 6).*

Demonstration of the following suitabilities shall be carried out in accordance with chapters 7 and/or 8 of the ERA technical document ERA/TD/2013-02/INT version 3.0 of 27.11.2015 published on the ERA website (http://www.era.europa.eu), if the friction element is intended to be suitable for:

- *train detection by systems based on track circuits; and/or*
- *severe environmental conditions.*

The tests specified in chapters 4, 5 and 6 of the ERA technical document ERA/TD/2013-02/INT are mandatory. The results of these tests have to be recorded in the technical documentation in order to define the area of use of a friction element for wheel tread brakes.

Appendix O sets out the requirements that friction elements for wheel tread brakes must meet in order to be compatible with train detection systems. It is based on ERA technical document ERA/TD/2013-02/INT version 3.0 of 27.11.2015 published on the ERA website (http://www.era.europa.eu).

Tests specified in chapters 7 'Suitability for train detection by systems based on track circuits' and 8 'Suitability for severe environmental conditions' are not mandatory. It is up to the manufacturer of the friction element to decide whether his product should be suitable for train detection by systems based on track circuits and/or severe environmental conditions and to perform these tests accordingly. If these tests are not performed, the friction element is considered as 'not suitable for train detection by systems based on track circuits' or 'not suitable for severe environmental conditions' respectively; the non-suitability for train detection by systems based on track circuits and/or severe environmental conditions should be mentioned in the technical documentation of the interoperability constituent.

A reference to the non-mandatory locked brake test specified in EN 16452:2015 is done in chapter 9 'Thermo mechanical characteristics'. Additional guidance is provided in this Application Guide (see section 2.4 providing guidance on points 4.2.3.6.3 and 6.1.2.3 of the TSI).

Please refer to section 2.11 of this Application Guide for further information on the ERA technical document ERA/TD/2013-02/INT.

If a manufacturer does not have sufficient return of experience (according with its own judgment) for the proposed design, the type validation by in-service experience procedure (module CV) shall be part of the assessment procedure for suitability for use. Before commencing in-service tests, a suitable module (CB or CH1) shall be used to certify the design of the interoperability constituent.

The manufacturer has the ultimate responsibility to meeting all the essential requirements applicable to a friction element. The WAG TSI further specifies mandatory in-service testing if there is insufficient return of experience for the proposed design of the friction element. The notion of return of experience is to be understood in this context. The manufacturer is the best placed actor to decide (under his sole responsibility) on its own maturity taking into account the area of use of the friction element on the one hand and the previous experience with similar types of friction elements on the other hand. The manufacturer may use the CSM Regulation for this purpose.

COTIF provisions equivalent to the CSM Regulation are set out in the UTP GEN-G.

According to Decision 2010/713/EU, it is the manufacturer who defines the programme for validation of a friction element by in-service experience using module CV. Annex V of EN 16452:2015 may be taken as reference. The provisions of this annex may be altered by the manufacturer taken into account the area of use of the friction element and the level of experience that the manufacturer possesses with similar designs of friction elements. The objective of in-service testing is to perform the tests under real conditions and tailored to match the area of use of the friction element.

COTIF provisions equivalent to Decision 2010/713/EU are set out in the UTP GEN-D.

2.3.20 Point 4.2.5: Environmental conditions

The design of the unit, as well as its constituents shall take into account the environmental conditions to which this rolling stock will be subjected to.

The environmental parameters are described in the clauses below. For each environmental parameter, a nominal range is defined, which is the most commonly encountered in Europe, and is the basis for the interoperable unit.

For certain environmental parameters ranges other than the nominal one are defined. In that case, a range shall be selected for the design of the unit.

For the functions identified in the clauses below, design and/or testing provisions taken to ensure that the rolling stock is meeting the TSI requirements in this range shall be described in the technical file.

Depending on the ranges selected and on provisions taken (described in the technical file), appropriate operating rules could be necessary when the unit designed for the nominal range is operated on a particular line where the nominal range is exceeded at certain periods of the year.

The ranges, if different from the nominal one, to be selected to avoid any restrictive operating rule(s) linked to environmental conditions, are specified by the Member States and are listed in section 7.4.

The unit and its constituents shall be designed under consideration of one or several of the following external air temperature ranges

- *T1: – 25 °C to + 40 °C (nominal),*
- *T2: – 40 °C to + 35 °C, and*
- *T3: – 25 °C to + 45 °C.*

The unit shall meet the requirements of this TSI without degradation for snow, ice and hail conditions as defined in clause 4.7 of EN 50125-1:2014, which correspond to the nominal range.

Where more severe 'snow, ice and hail' conditions are selected, the unit and its constituents shall then be designed to meet TSI requirements considering the combined effect with low temperature according to the temperature range chosen.

In relation with the temperature range T2 and with the severe conditions for snow, ice and hail, the provisions taken to meet TSI requirements in these severe conditions shall be identified and verified, in particular design and/or testing provisions considering the following functions:

- *Coupling function, restricted to the resiliency of couplings.*
- *Brake function, including brake equipment.*

The TSI mandates that environmental conditions of temperature and snow/ice/hail be taken into account in the design of the wagon. Therefore, nominal conditions are set out (temperature range T1 and snow/ice/hail conditions in EN 50125-1:2014).

However, a few MSs have concerns because they meet more severe conditions in some periods of the year. To cover that, severe conditions are specified for the parameters temperature and snow/ice/hail. Concerning the temperature, the ranges T2 (– 40 °C to + 35 °C) and T3 (– 25 °C to + 45 °C) have been introduced, concerning the snow/ice/hail conditions the WAG TSI refers to section 7.4 in case of more severe conditions than those set out in EN 50125-1:2014.

The design and the assessment of a wagon may be completely assessed under nominal conditions or under consideration of one or both of the severe conditions.

The provisions in design and/or in testing taken to meet the chosen conditions are to be reported in the technical file and can be used to establish operating rules e.g. operating rules to take into account the more severe conditions during certain periods of the year in certain Member States.

For unrestricted access concerning the environmental conditions in the MS concerned the conditions set out in section 7.4 of the WAG TSI have to be fulfilled.

The term 'coupling function' in the TSI text covers the function of drawing and buffing equipment.

2.3.21 Point 4.2.6.1.1: Fire safety - General

All significant potential fire sources (high risk components) on the unit shall be identified. The fire safety aspects of the unit design shall be aimed at:

- *preventing a fire from occurring,*
- *limiting the effects if a fire occurs.*

The goods carried on the unit are not part of the unit and do not have to be taken into account in the conformity assessment.

Significant potential fire sources and high-risk components include: contact surfaces of brake blocks, tanks containing flammable liquids, electrical equipment (including cables), combustion engines, heat exchanging equipment like air-conditioning systems.

The fire safety requirements in this TSI are not aimed at the transport of dangerous goods. In case of dangerous goods carried on freight wagons, RID requirements are to be applied in all aspects of fire safety.

2.3.22 Point 4.2.6.1.2.1: Fire safety - Barriers

In order to limit the effects of fire, fire barriers with integrity of at least 15 minutes shall be installed between the identified potential fire sources (high risk components) and the carried load.

According to the general experience, a likely fire source on wheel tread braked wagons can be brake blocks.

Technical solutions in accordance with UIC leaflets 430-1:2012 and 543:2014, which contain elements to be fitted above wheels, give presumption of conformity to the requirement in point "4.2.6.1.2.1 Barriers", for the area above the brake blocks, e.g. wooden floor and running gear.

2.3.23 Points 4.2.6.1.2.2 and 6.2.2.8.2: Fire safety – Materials

All permanent materials used on the unit shall have limited ignitability and flame spread properties, unless:

- *the material is separated from all potential fire risks on the unit by a fire barrier and the safe application is supported by a risk assessment, or*
- *the component has a mass < 400 g, and is located within a horizontal distance of ≥ 40 mm and a vertical distance of ≥ 400 mm to other non-tested components.*

The demonstration of conformity is described in point 6.2.2.8.2.

E.g. rubber parts and synthetic or plastic material of bogies are not to be tested when their main surface is surrounded of a fire barrier compliant with point 6.2.2.8.1 of this TSI and they are supported by a risk assessment.

The expression in point 4.2.6.1.2.2 'the component has a mass less than 400 g' refers to the mass of the material without proven limited ignitability and flame spread properties.

2.3.24 Point 4.5.3: Maintenance description file

The maintenance description file includes the following:

– ...
– *Parts list which shall contain the technical and functional descriptions of the spare parts (replaceable units). The list shall include all parts specified for changing based on condition, which may require a replacement following electrical or mechanical malfunction or which will foreseeable require a replacement after an accidental damage. Interoperability constituents shall be indicated and referenced to their corresponding declaration of conformity.*
– ...

It is recommended to add to the parts list also the references from the spare part provider and manufacturer, in order to allow identification and procurement of the correct spare parts.

The maintenance description file includes the following:

– ...
– *Maintenance plan i.e. the structured set of tasks to perform the maintenance including the activities, procedures and means. The description of this set of tasks includes:*
  (a) *Disassembly/assembly instructions drawings necessary for correct assembly/disassembly of replaceable parts.*
  (b) *Maintenance criteria.*
  (c) *Checks and tests in particular of safety relevant parts; these include visual inspection and non-destructive tests (where appropriate e.g. to detect deficiencies that may impair safety).*
  (d) *Tools and materials required to undertake the task.*
  (e) *Consumables required to undertake the task.*
  (f) *Personal protective safety provision and equipment.*
– ...

It is recommended that the following results of the Task Force on Freight Wagon Maintenance are included in the maintenance description file as they are considered as good practice:

– The harmonised maintenance program of inspection of axles, EVIC that is effective to reduce risks related to corrosion but insufficient to eliminate them completely. (See Annex III of Final report on the activities of the Task Force Freight Wagon Maintenance)
– The identification of the data that needs to be collected in the European Wheelset Traceability Catalogue, EWT (See Annex IV of Final report on the activities of the Task Force Freight Wagon Maintenance)
– The European Common Criteria for Maintenance for freight wagon axles, ECCM (See Annex V of Final report on the activities of the Task Force Freight Wagon Maintenance)

These three documents on railway maintenance, which were developed by the railway sector, should be taken into account by the applicant in the maintenance description file respectively for:

– The development and update of visual inspections on axles (EVIC)
– Defining the content of the part of the configuration file addressing wheelsets (EWT)
– Harmonising the maintenance plans (ECCM) when appropriate

Regarding visual inspections there might be different understandings if they also belong to visual inspections carried out in the operational field outside of a maintenance workshop (see the final report ‘certification of maintenance workshops’ 01.08.2008, clause 5.1 first steps of maintenance). It is up to the RU and keeper/ECM to carry out the visual inspection, for example as agreed in the GCU.

Visual inspections may be carried out in maintenance workshops or in the operational field, for example by inspectors.

If the applicant can demonstrate through experience and risk assessment that it has more effective maintenance rules than the here-above recommended good practises, it should better introduce these in its maintenance description file.

~~a)~~ Any RU hauling the vehicle should:

- ~~carry out a procedure for~~ check~~ing~~ basic information about the vehicle's maintenance, in particular whether an ECM is registered for this vehicle in the vehicle register and~~, in the case of a freight wagon,~~ whether a valid certificate exists for this ECM covering the respective scope of use of the wagon, such as dangerous goods;
- ~~–~~ perform checks before the departure of a train in accordance with the UTP TCRC;~~, such as a brake test, composition of the train in conjunction with the route to be taken, "visual check" for technical deficiencies which might endanger safe (onward) carriage, check that the deadline for maintenance registered or marked on the vehicle has been observed, and,~~
- ~~where necessary, perform the checks to be carried out en route and take appropriate action in case of operational incidents, e.g. a hot axle box;~~
- ensure that it is able to hand over data to the ECM of the vehicle in due time, particularly on its operating performance (km, tonne.km), malfunctions, accidents, incidents, near-misses and other dangerous occurrences, as well as on any restrictions on the use of the vehicle, inspections and repairs made in the period during which the vehicle has been in its charge.

If these checks reveal deficiencies or problems relating to safety, the RU should take appropriate measures, i.e. resolve the problem or refuse further carriage.

~~b)~~ The tasks and responsibilities of the ECM ~~should~~are set out in Article 15 of the ATMF UR and in Annex A to the ATMF UR.

- ~~ensure that it is able to receive and use data from the respective RUs (see above) through its contractual agreements;~~
- ~~ensure that the carrying RUs can obtain information on updates concerning restrictions on the use of the wagon, and~~
- ~~provide information on the maintenance of a freight wagon as requested from a RU for its operational purposes. This does not mean that the ECM would have to inform the RU of all its maintenance processes, which the RU is not responsible for checking.~~

2.3.25 Section 4.7: Health and Safety conditions

If the unit is fitted with a manual coupling system, a free space for shunters during coupling and uncoupling shall be provided.

The free space for shunter as defined in clause 6.2.1 of EN 16116-2:2013 is deemed to be in conformity with this requirement of the TSI.

~~Appendix L of UTP WAG defines the space for shunting staff.~~

All protruding parts deemed a hazard to operational staff shall be clearly indicated and/or fitted with protective devices.

Protective devices as described in clause 1.3 of UIC 535-2:2006 are deemed to be in conformity with this requirement of the TSI.

The unit shall be equipped with footsteps and handrails except in those cases it is not intended to be operated with staff on-board, e.g. for shunting.

Footsteps and handrails in accordance with chapter 4 and 5 of EN 16116-2:2013 are deemed to be in conformity with the requirement of the TSI.

~~Appendix M of UTP WAG defines footsteps and handrails.~~

2.3.26 Section 4.8: Parameters to be recorded in the technical file and European register of authorised types of vehicles

The heading of section 4.8 of the UTP reads: *"Parameters to be recorded in the technical file"*

There is no OTIF equivalent of the register of authorised types. Parameters should be recorded in the technical file.

The technical file shall contain at least the following parameters:

- *...*
- *Position of the axles along the unit and number of axles*
- *...*

The position of the axle along the unit and number of axles is the geometrical position of the axles in the unit according to EN 15528:2015.

2.4 Interoperability constituent(s)

An IC can be defined if its requirements in the TSI can be assessed independently from the subsystem on constituent level and if its area of use can be specified.

The area of use covers all conditions under which the constituents are intended to be used and their technical boundaries.

Interoperability Constituents, as defined in Article 2(g) of ATMF UR (Appendix G to the Convention), are also referred to as "Elements of Construction", or "ICs".

In accordance with the UTP GEN-D, ICs may be assessed separately or as part of the subsystem, depending on the applicable law in the Contracting State. If, for example, EU law applies in the state concerned, ICs must be assessed separately. The conformity assessment procedure for ICs is explained in point 2.5.1 of this application guide.

2.4.1 Point 5.3.3: Wheel

A wheel shall be designed and assessed for an area of use defined by:

- *nominal tread diameter,*
- *maximum vertical static force,*
- *maximum speed,*
- *in-service limits, and*
- *maximum braking energy.*

The in-service limits may be defined by the minimum tread diameter.

The last bullet point indicates also the capability to be combined with a certain brake principle. For example, when the brake force is not acting directly on the tread a very low braking energy or zero is stated for this parameter.

2.5 Conformity assessment and EC verification

Explanations concerning the conformity assessment in section 6.1 and 6.2 of the WAG TSI are incorporated in section 2.4 of this application guide.

Because the purpose and scope of COTIF and EU law are not the same, different terminology for concepts that have a similar but not identical meaning has been used. As a result, the table of corresponding terms has been added to the UTP WAG in Chapter 0 – Equivalence:

The declaration of conformity	The EC declaration of conformity
Type examination	EC type examination
Type or design examination certificate	EC type or design examination certificate
UTP verification procedure	EC verification procedure
UTP declaration of verification	EC declaration of verification
UTP Certificate of verification	EC Certificate of verification

2.5.1 Section 6.1: Conformity assessment procedures

'(*) Modules CA1, CA2 or CH may be used only in the case of products placed on the market, and therefore developed, before the entry into force of this TSI, […]'

Modules CA1, CA2 or CH may be used only in the case of products manufactured according to a design developed and already used to place products on the market before the entry into force of relevant TSIs applicable to those products.

Sections 5.1 and 6.1.2 of the UTP WAG provide information and requirements with regard to the assessment of ICs.

Composite "brake blocks", which comply with chapter 8 of Appendix O, may still require special operational measures to ensure their safe use in severe Nordic winter conditions. The European Commission and ERA are investigating the subject at EU level, which may lead to further recommendations. See: https://ec.europa.eu/transparency/regdoc/rep/10102/2020/EN/SWD-2020-240-F1-EN-MAINPART-1.PDF

2.5.2 Section 6.3: Subsystem containing components corresponding to interoperability constituents not holding an EC declaration

A Notified Body is permitted to issue an EC certificate of verification of a subsystem, even if one or more of the components corresponding to interoperability constituents incorporated within the subsystem are not covered by a relevant EC declaration of conformity…

Section 6.3 of the TSI WAG is not taken over in the UTP. The reason is that this section of the TSI describes the possibility of assessing an IC as part of the subsystem, which in EU law requires a

specific justification, but not in COTIF. In any case, the IC must comply with all UTP requirements that apply to it.

When a constituent is considered as an IC, the use of a constituent holding an EC declaration is mandatory to get an EC declaration of verification for a RST subsystem unless the conditions set out in section 6.3 of the WAG TSI are applied.

~~The assessment of ICs separate from the subsystem is not mandatory in OTIF regulations, unless required by a Contracting State; ICs which have been integrated into a vehicle could therefore be assessed together with the vehicle.~~

~~Section 6.3 of the UTP is only relevant in cases where the separate assessment of ICs is mandatory.~~

Only components corresponding to an IC not holding an EC certificate (non-certified ICs as defined in point 7.2.1 of the TSI), which are produced before or within the transitional period referred to in section 6.3 as well as in Article 8 of the Commission Regulation (EU) No 321/2013 are allowed to be incorporated in the subsystem. Within this period the manufacturer must obtain an EC certificate otherwise he has to stop the production. Exemption is the running gear, where point 4.2.3.5.2 of the TSI always allows the applicant to choose for the assessment on subsystem level in accordance with point 6.2.2.3 or on interoperability constituent level in accordance with point 6.1.2.1.

~~ICs which have been integrated into a new vehicle could be assessed together with the vehicle instead of being assessed separately. In this case, all parameters relevant to the IC must be assessed together with the vehicle.~~

~~It is also possible to use certified ICs and in some cases non-certified ICs. As an example the wagon manufacturer could buy from a sub-supplier certain parts that correspond to an IC and incorporate them into the wagon. Section 6.3 sets out the rules relating to such use of ICs.~~

~~If certified ICs are used, the corresponding certificates act as proof of conformity of the ICs and the parameters concerned by the IC certificate do not have to be assessed again on the vehicle.~~

~~Under certain conditions, as set out in section 6.3, it is permitted to use ICs which are not covered by a declaration of conformity in accordance with the (latest) UTP WAG.~~

~~Both for substitution on existing wagons and for use on new wagons, the following ICs built before 1.1.2014 may be fitted, under the conditions set out in section 6.3:~~

- ~~running gear~~
- ~~wheelset~~
- ~~wheel~~
- ~~axle~~

~~Separately assessed ICs "rear-end signal" should be covered by the declaration of conformity from 1.1.2015.~~

2.6 Implementation

2.6.1 Point 7.1.2: Mutual recognition of the first authorisation for placing on the market

In accordance with Article 21(3)(b) of Directive (EU) 2016/797 the authorisation for placing on the market of a vehicle (as defined in this TSI) is granted on the basis of:

- *in accordance with point (a) of Article 21(3): the 'EC' declaration of verification as provided for in Article 15 of the same directive, and*
- *in accordance with (d) of Article 21(3): evidence of the technical compatibility of the unit with the network in the area of use covering the EU network.*

Points (b) and (c) of Article 21(3) of Directive (EU) 2016/797 do not represent any additional requirement. The technical compatibility of the vehicle with the network being covered by rules (TSIs or national rules), this aspect is also considered at the level of the 'EC' verification.

Therefore, the conditions for having an area of use not limited to particular national networks are specified below as additional requirements to be covered in the EC verification of the subsystem rolling stock. These conditions shall be seen as complementary to the requirements in Section 4.2 and must be fulfilled in their entirety:

~~The same principle applies to OTIF, based on ATMF Article 6 § 4b.~~

The same principle applies to OTIF, based on ~~ATMF~~ Article 6 § 3 of the ATMF UR.

A wagon that complies with all mandatory requirements in the UTP and with the optional additional conditions set out in section 7.1.2 and which is admitted to operation in one of the OTIF Contracting States will automatically be admitted to operation in all other Contracting States. The legal basis for this is set out in Articles 3a § 2 and 6 § 3 of the ATMF UR. This principle is referred to as "free circulation". Free circulation should be understood in the scope and context of the ATMF UR, meaning, inter alia, that freedom of circulation is limited to international traffic.

Vehicles that may circulate freely remain subject to route compatibility checks as defined in the UTP TCRC in order to ensure that the vehicles are fully compatible with the routes on which they are operated.

The precondition to apply the point 7.1.2 of the WAG TSI is that the unit is conforming to all the requirements of chapter 4 of the TSI.

The conditions in the bullet point (b) define the way to deal with the specific case of Sweden. All other specific cases in section 7.3 of the WAG TSI are alleviations solely applicable to domestic traffic, therefore not touching interoperability and subsequently not relevant for the mutual recognition.

Nevertheless, some Member States/NSAs requested for additional conditions for the mutual recognition of the first authorisation with regard to concerns related to the application of the new approach. In (c) and (d) two conditions are to be found related to the compatibility with the network, and the points (e) to (f) refer to technical solutions coming from the former RIV world.

The UTP ~~does not~~ contains specific cases applicable to the non-EU OTIF Contracting States, notably specific cases that apply to the Great Britain network of the United Kingdom in terms of international traffic. ~~It should be remembered that COTIF and its UTPs only apply to international traffic.~~

The conditions in bullet point (g) and (h) relates to the marking of the vehicle. The applicable markings as defined in the EN 15877-1:2012 may be:

- the allocated interoperable gauge,
- the vehicle tare weight,
- the vehicle load table,
- the length over buffers,
- the lifting and re-railing signs,
- the distance between end axles or bogie centres,
- the brake weight,
- wagons built for running between networks with different track gauges.

Units authorised in accordance with this TSI including the additional conditions set out in point 7.1.2 should be marked 'TEN' in accordance with OPE TSI, point 4.2.2.3 and Appendix H thereof.

COTIF provisions equivalent to point 4.2.2.3 and Appendix H to OPE TSI are set out in the UTP Marking.

For existing units, which have been authorised in accordance with Commission Decision 2006/861/EC as amended by Commission Decision 2009/107/EC, and meeting the conditions set out in point 7.6.4 of Commission Decision 2009/107/EC but not fulfilling at least one of the following requirements:

- point 7.6.4 (c) of Commission Decision 2009/107/EC,
- point 7.6.4 (d) of Commission Decision 2009/107/EC,
- Annex Z of Commission Decision 2006/861/EC.

may apply the provisions on modifications to an existing unit covered by an EC certificate of verification set out in point 7.2.2.3 of this TSI in order to demonstrate that they may receive the CW marking.

The EVN (European Vehicle Number) of the wagon should not change after receiving the new marking.

Traditionally, RIV wagons have an axle distance not exceeding 17,500 mm. In accordance ~~W~~with ~~the introduction of~~ the UTP WAG, new wagons may be granted "free circulation" with an axle distance not exceeding 20,000 mm. The 17,500 mm limitation was removed from clause 7.1.2 of the TSI for the following reasons:

A train detection section shorter than 20,000 mm is considered unusual. Today, most of the infrastructure is believed not to have such particularly short sections. For the EU "target system", 20,000 mm is the maximum distance between two consecutive axles (for both track side CCS and rolling stock, as set out in the respective TSIs). This value has been taken over because of the existing (non-RIV) and potential future wagons, ~~-~~on which the distance between axles exceeds 17,500 mm. These kinds of wagons are mainly intended for special types of transport.

The link between conformity with the TSIs or UTPs and the technical compatibility between the train and the route on which it is operated is as follows;

a) Conformity with clause 7.1.2 does not guarantee technical compatibility with any existing line. The verification procedure and the documentation in the technical file provide all the vehicle-related data necessary for checking technical compatibility. Distance between axles is one such parameter.

b) According to ~~ATMF~~ Articles~~-~~ 6 § 2, 9 and 15a of the ATMF UR and the UTP ~~WAG Appendix I~~TCRC ~~and the OPE TSI~~, it is the responsibility of the RU operating a train to check that the train and all of the vehicles it is composed of are ~~it is technically~~ compatible with the route on which it is intended to be operated.

No additional verification would need to be carried out for an additional admission to operation (the parameter and the corresponding value are already known from the first admission, as are the rules on how to use the wagon).

Therefore, it was not considered appropriate to restrict the application of clause 7.1.2 of the revised WAG TSI/UTP WAG to vehicles with the maximum distance between two consecutive axles ~~limited to~~of 17, 500 mm.

~~These principles apply to all the parameters relating to technical compatibility with the network and are in line with what was concluded by the OTIF "Safety subgroup" (meetings in 2012/2013). These principles have subsequently been introduced intoappendix I of the UTP WAG.~~

~~A train detection section shorter than 20,000 mm is considered unusual. Today, most of the infrastructure is believed not to have such particularly short sections.~~In any case, railway undertakings have the duty to check compatibility between the train, including all the vehicles it is composed of, and the route on which the train will run in accordance with the UTP TCRC.

2.6.2 Point 7.2.1: Substitution of constituents

The word 'check' in Table 11 means that the entity in charge of maintenance (ECM) may under its responsibility substitute a component by another one utilising the same function and performance in accordance with the relevant TSI requirements…

When a component is considered as an interoperability constituent (IC) in chapter 5 of the TSI, its use within the context of substitution, renewal and upgrading is set out in point 7.2.1 of the WAG TSI.

The separate assessment of ICs in the context of admission to operation of new vehicles is not mandatory in COTIF.

The following components are defined as ICs:

- running gear
- wheelset
- wheel
- axle
- friction elements for wheel tread brakes
- automatic variable gauge system
- rear-end signal

The replacement of an IC during substitution, renewal or upgrade is primarily the responsibility of the ECM, which must keep the vehicle in a good state of maintenance in such way that it continues to comply with the provisions specified in the UTP (cf. the ATMF UR Art.15 § 1).

If substitution, renewal or upgrade leads to a different function or performance of a parameter defined in the UTP, the wagon may need a new admission to operation. Such a decision is up to the discretion of the Contracting State which first admitted the wagon to operation.

When components which are defined as ICs are replaced, the replacement IC must meet the UTP ~~conditions~~requirements. In such a case, the replacement IC is logically assessed separately as an IC, as it was not tested as part of the subsystem during the initial admission of the wagon.

The clarification in the TSI about ICs in the context of substitution, renewal and upgrading was necessary because these rules are needed for the WP members to assess whether or not a constituent should be declared as an IC. They are strictly based on the ECM regulation.

COTIF ~~regulations~~ provisions equivalent to the EU ECM regulation are set out in ~~ATMF~~ Annex A to the ATMF UR.~~, reference A 94-30/1.2012.~~

Only components corresponding to an IC not holding an EC certificate (non-certified ICs as defined in point 7.2.1 of the TSI), which are produced before or within the transitional period referred to in section 6.3 and indicated in this TSI, are allowed to be used for substitution.

The use of non-certified ICs within the transitional period is explained in point 2.5.1 of this application guide.

The distinction between 'component' and 'interoperability constituent' had to be made because the 'component' means a tangible part of the subsystem and the 'interoperability constituent' is defined by functions.

The text following table 11 in the WAG TSI explains when the ECM has a role to play and what the checks consist of.

2.6.3 Clause 7.2.2 Changes to an existing unit or to an existing unit type, clause 7.2.2.1 Introduction

[…] The holder of the vehicle type authorisation shall provide, under reasonable conditions, the information necessary for assessing the changes to the entity managing the change.

Each entity managing the change needs to ensure, that all relevant information for the intended changes are available before changing any existing rolling stock. If the holder of the type authorisation is not the same as the entity managing the change, the entity managing the change should request the holder of type authorisation all necessary information to perform the change. Contractual arrangements may be needed between the holder of the vehicle type and entity managing the change to facilitate the information needed.

Where EU law refers to the holder of the type authorisation, the comparable term in COTIF is the holder of the Design Type Certificate.

Other possibilities (e.g., that the holder of type authorisation performs the change) are analysed in the guidance to Article 15 of Implementing regulation (EU) 2018/545.

At EU level, Regulation (EU) 2018/545 establishes practical arrangements for the railway vehicle authorisation and railway vehicle type authorisation process pursuant to Directive (EU) 2016/797. There are no corresponding COTIF rules concerning practical arrangements for vehicle admission.

The categorisation of changes and the requirements applicable to each category are equivalent in the TSI and the UTP.

Implementing regulation (EU) 2018/545 requires in case of changes of authorised vehicles that the changes shall be categorised according to its Article 15 (1). Even for the small changes it has to be checked if there is a "deviation from the technical files accompanying the EC declarations for verification for the subsystems", see Article 15(1)(a) and (b). Therefore, each entity managing the change needs this technical file or all documents related to the change.

[…] In any case, the entity managing the change shall ensure that the technical documentation which is relating to the EC type or design examination certificate is updated accordingly.

Further explanation is provided in the Guidance for the application of Regulation 2018/545.

2.6.4 Point 7.2.2.2: Rules to manage changes in both a unit or a unit type

The safety judgement mandated in Article 21(12)(b) of Directive (EU) 2016/797 shall cover changes concerning basic parameters of the table of section 3.1, related to all the essential requirements, in particular the requirements "Safety" and "Technical compatibility"

The general safety judgement mandated in Article 21(12)(b) of Directive (EU) 2016/797 should cover all aspects related to the change. Article 13 of the Commission Implementing Regulation (EU) 2018/545 further explains how the essential requirements 'safety' and 'technical compatibility' impacted by the change are to be dealt with.

Point 7.2.2.2 of the UTP describes four categories of changes.

Category 1 changes are minor changes that do not require any further action, as they do not change (values relating to) compliance with UTP requirements or the description of the vehicle in its technical file. No new admission is required.

Category 2 changes have an impact on (values relating to) compliance with UTP requirements and require that the technical file be updated. However, changes of category 2 must not change the design characteristics listed in table 11a. No new admission is required.

Category 3 are changes that affect one or more parameters of table 11a but remain within the limits or conditions described in column 3 of table 11a. No new admission is required.

Category 4 are changes that affect the parameters of table 11a, either by a change described in column 4 or by a change that exceeds the limits or conditions defined in column 3. A new admission is required.

Changes of categories 3 and 4 are subject to risk assessment in accordance with UTP GEN-G.

The replacement of a whole element within a rake of permanently connected elements after a severe damage does not require a conformity assessment against this TSI, as long as the element is identical to the one it replaces. Such element must be traceable and certified in accordance with any national or international rule, or any code of practice widely acknowledged in the railway domain.

In case of two units each consisting of two permanently connected elements which need to be reconfigured, e.g. due to an accident, it may be possible to form a new unit from two elements of the different units. If the European Vehicle Number (EVN) applies to the whole unit, the EVN of one of the units may be retained without requiring new authorisation.

2.7 Appendices of the WAG TSI

2.7.1 Appendix C: Additional optional conditions

Appendix C consists of a set of detailed prescriptions of conditions and technical solutions optimised for the free exchange of wagons and its adhered operative regime and maintenance concept of the incumbent railway undertakings.

Next to the compliance with the core TSI requirements in chapter 4 and the fulfilment of the complete set of conditions in point 7.1.2 the wagon may also fulfil the conditions of Appendix C. The fulfilment of the Appendix C conditions is optional and not needed to achieve TSI conformity.

If an applicant choses for the application of Appendix C the fulfilment of all conditions become mandatory and shall be assessed by a notified body. Appendix C.5 allows for a limited fulfilment where the conditions C.3 and/or C.6 and/or C.7b are excluded.

The responsibility for safe operation and in particular under which conditions a certain wagon can be operated remains always with the transporting RUs. These RUs may decide that particular wagons of the existing fleet could be operated like wagons marked TEN GE or TEN CW. In this case the RUs are free to indicate this in an appropriate way as part of their SMS.

Appendix C sets out the requirements ~~conditions~~that a wagon must comply with in order for it ~~for marking a wagon~~to be marked with the letters “GE” or “CW”.

“GE” marked wagons provide for a particular level of compatibility with the network and operative regimes. “GE” wagons may be hump shunted, comply with the G1 gauge and have an axle distance not exceeding 17,500 mm.

“CW” marked wagons do not comply with all the conditions set out in the previous paragraph. One parameter that stands out is the axle distance, which may be 20,000 mm on “CW” marked wagons.

Article 3 of the enacting part of the WAG TSI allows for wagons authorised according to the previous technical specification for interoperability relating to the subsystem ‘rolling stock — freight wagons’ (Decision 2006/861/EC and its amendments) and fulfilling the conditions set out in point 7.6.4 thereof

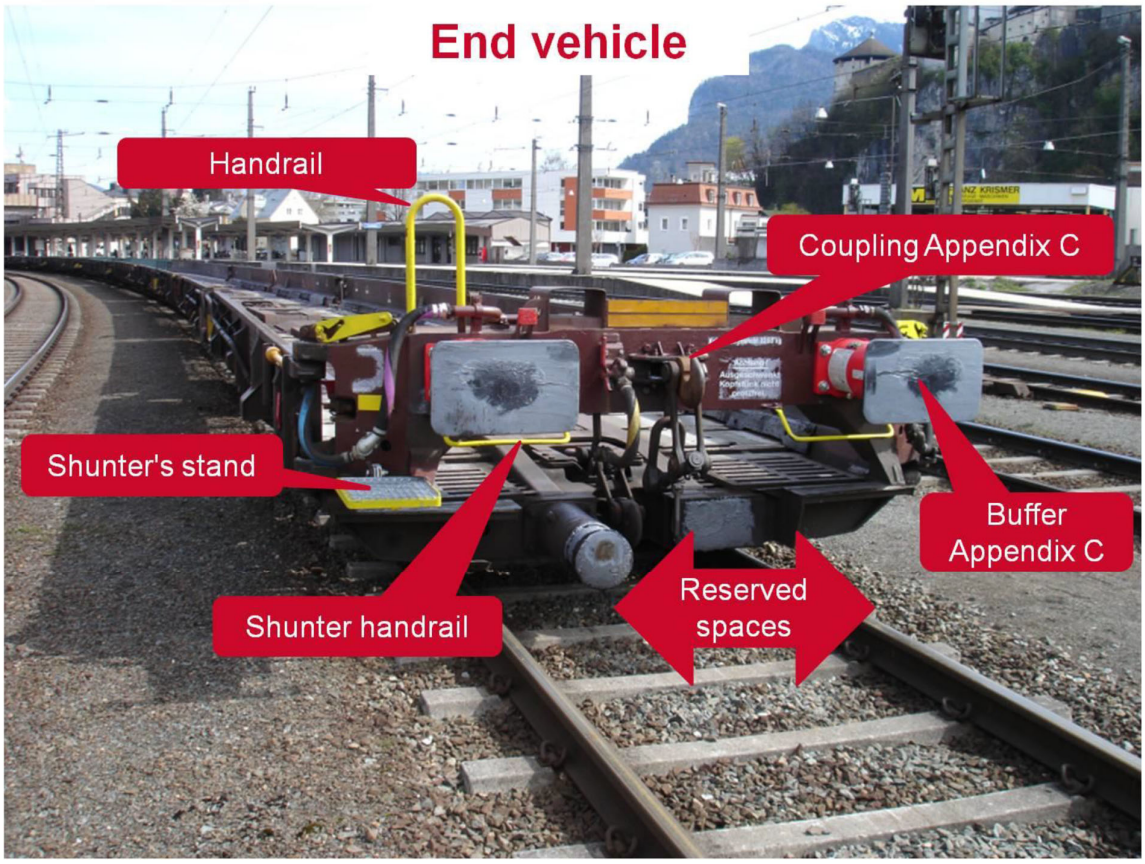
to obtain ‘GE’ marking without any additional assessment or new authorisation for placing in service. Although conditions specified in point 7.6.4 of the previous WAG TSI are not the same as those specified in point 7.1.2 and Appendix C of this WAG TSI, RUs may use the ‘GE’ marking for freight wagons authorised in accordance with both TSIs. The RUs should check the technical file of the wagon in order to verify that the ‘GE’ marking is suitable considering the intended conditions of use of the wagon. In any case, the interpretation of this marking for operational purposes remains under the responsibility of the RUs.

2.8 Practical cases

Example of a unit to carry lorries (‘Rollende Landstrasse’)

In general several units to carry lorries are forming a block train. At each end of the block train the unit is fitted with movable head stocks which are equipped with footsteps and handrails (see Figure 10).

Figure 10: Example of a unit to carry lorries (‘Rollende Landstrasse’)



Appendix H sets out the requirements ~~conditions~~ that wagons must meet in order to be compatible with train detection systems. It is based on ERA document ERA/ERTMS/033281 rev. 4.0.~~, The right-hand (EU) column does not appear in the WAG TSI, but in an Annex to the CCS TSI.~~ As there is no equivalen~~ce with~~ to the CCS TSI in OTIF, the specifications have been included in Appendix H ~~of~~to the UTP WAG.

The UTP TCRC~~Appendix I~~ sets out ~~the operating~~ requirements to be met by the railway undertaking when operating a wagon. The specifications of ~~Appendix I~~UTP TCRC need not be checked by the assessing entity. ~~The right-hand (EU) column does not appear in the WAG TSI, but in the OPE TSI. As there is no equivalence with the OPE TSI in OTIF, the specifications have been included in the UTP WAG.~~

2.9 Transition phases concerning friction elements for wheel tread brakes

WAG TSI provides transition phases for friction elements for wheel tread brakes.

Before the application of Commission Regulation (EU) 2015/924 fully approved composite brake blocks were listed in Appendix G (in the form of a link to the list of fully approved composite brake blocks for international transport published on the ERA website) and used in case the text of the WAG TSI made a reference to this appendix.

Appendix G to UTP WAG refers to the ERA technical document ERA/TD/2009-02/INT, version 15.0 of 23.7.2015, published on the ERA website (http://www.era.europa.eu), which sets out the list of fully approved composite brake blocks for international transport.

With the application of Commission Regulation (EU) 2015/924 a new interoperability constituent 'friction element for wheel tread brakes' has been created. This interoperability constituent comprises any friction element that acts on wheel's tread including composite brake blocks as well as cast iron brake blocks.

Appendix G will be managed by ERA until the friction elements listed in it are not yet covered by EC declarations of conformity (cf. Article 10). Transition period in Article 8b is provided for friction elements that have already been listed in Appendix G before the application of Regulation 2015/924 in the sense that they are deemed TSI compliant until the end of their current approval period. This transition period should be used by the manufacturer to obtain EC certificate of conformity from a notified body and subsequently to issue EC declaration of conformity.

For obtaining EC certificate of conformity for a friction element for wheel tread brakes the manufacturer or his authorised representative established within the European Union should choose conformity assessment modules according to Table 9 of the WAG TSI. As technical documentation the manufacturer may provide notified body with the proof of compliance to the UIC requirements based on which the friction element has been included in Appendix G plus documentation regarding the manufacturing process. The notified body should make sure among other things that all the parameters specifying the area of use of the friction element according to point 5.3.4a of the WAG TSI are provided by the manufacturer before issuing EC certificate of conformity.

On top of the already explained transition phase for friction elements listed in Appendix G there are two other transition phases concerning components corresponding to the designs of friction elements for wheel tread brakes:

- components manufactured before the application of Regulation 2015/924 (e.g. according to notified national technical rules) and
- components corresponding to Appendix G designs of friction elements and manufactured before the expiry of the approval period.

For these components transition phase of 10 years is provided for their use in subsystem provided conditions of Article 8a and Article 8c respectively are fulfilled.

This means that since the date of application of Regulation 2015/924 no new friction elements are to be produced according to NNTRs with exception of friction elements intended for substitution in the framework of maintenance.

Since the date of application of Regulation 2015/924 no new friction elements will be newly listed in Appendix G. The reason for that is that since 1st July 2015 an EU procedure for friction elements will be used.

2.10 ERA technical document ERA/TD/2013-02/INT

Appendix O sets out the requirements that friction elements for wheel tread brakes (i.e. brake blocks) must meet in order to be compatible with train detection systems. Appendix O is based on ERA technical document ERA/TD/2013-02/INT version 3.0 of 27.11.2015 published on the ERA website (http://www.era.europa.eu).

The ERA technical document ERA/TD/2013-02/INT 'Friction elements for wheel tread brakes for freight wagons' published on the ERA website (http://www.era.europa.eu) is based on EN 16452:2015 'Railway applications — Braking — Brake blocks'. The tests defined in the technical document are more generic than those of EN 16452:2015, because the technical document cover more braking systems than UIC.

In the following text the link between these two documents is described.

2.10.1 Chapter 4 ‘Dynamic friction coefficient’ of the ERA TD

The dynamometer test program for friction elements for wheel tread brakes to determine the dynamic friction coefficient μdyn is set out in table 1.

Dynamic friction coefficients and their tolerance bands form part of the parameters that characterise the area of use of the friction element for wheel tread brakes. The dynamometer test programme to determine these values is mandatory within the assessment procedure of friction elements.

Normative Annexes C, D and E and informative Annex J of EN 16452:2015 provide basis for the dynamometer test programme set out in table 1. The dynamometer test programme is generic to allow a wide range of designs of friction elements for wheel tread brakes to be tested.

During the tests described in table 1 the following conditions shall be respected:

The conditions to be respected while performing dynamometer test programme to determine the dynamic friction coefficient are set out in the ERA TD. They represent a generalisation of the conditions described in Annex B of EN 16452:2015.

In relation to the characteristics described in this chapter, in case the manufacturer chooses to apply some of the harmonised acceptance criteria for dynamic friction performance as specified in EN 16452:2015, the compliance to these harmonised acceptance criteria have to be stated in the technical documentation as part of the area of use of the friction element for wheel tread brakes.

There are no acceptance criteria for dynamic friction coefficients and their tolerance bands specified in the ERA TD. The reasoning behind is to allow for different values of the characterising friction elements’ parameters; the values need to be recorded in the technical documentation. Based on these values the applicant can choose the ones that suit the characteristics of his project. The intention is to widen the possible technical solutions pertaining to friction elements in order to allow for a technical development of the sector.

Nevertheless, a link is established with the harmonised acceptance criteria defined in EN 16452:2015 - Annex J.4. If a friction element fulfils some of these harmonised acceptance criteria and if the manufacturer intends to point out this conformity he can do so in the technical documentation of the friction element.

2.10.2 Chapter 5 ‘Static friction coefficient’ of the ERA TD

The dynamometer test program to determine the static friction coefficient μstat of friction elements for wheel tread brakes is set out in table 4.

Minimum static friction coefficient form part of the parameters that characterise the area of use of the friction element for wheel tread brakes. The dynamometer test programme to determine this value is mandatory within the assessment procedure of friction elements.

Annex Q of EN 16452:2015 provides basis for the dynamometer test programme set out in table 4. The dynamometer test programme is generic to allow a wide range of designs of friction elements for wheel tread brakes to be tested.

For each brake application (n° 1 to 20) the static friction coefficient shall be determined which is the value of the instantaneous friction coefficient at the time corresponding to the commencement of

sliding (mean value calculated from the measurement records for the intersection between the linearised characteristic line of the rotation angle and the time axis) as described in figure 1.

The definition of the static friction coefficient corresponds to Annex Q.4.1 of EN 16452:2015.

During the tests described in table 4 the following conditions shall be respected:

The conditions to be respected while performing dynamometer test programme to determine the static friction coefficient are set out in the ERA TD. They represent a generalisation of the conditions described in Annex Q.4.3 of EN 16452:2015.

For each force the average value of the 5 measurements shall be determined. The lowest average value is the characterising static friction coefficient.

There are no acceptance criteria for static friction coefficient specified in the ERA TD. The reasoning behind is to allow for different values of the characterising friction elements' parameters; the values need to be recorded in the technical documentation. Based on these values the applicant can choose the ones that suit the characteristics of his project. The intention is to widen the possible technical solutions pertaining to friction elements in order to allow for a technical development of the sector.

2.10.3 Chapter 6 'Mechanical characteristics' of the ERA TD

The mechanical characteristics of the assembly between back plate and friction element for wheel tread brakes shall be tested with the test procedures set out in sections 6.1 and 6.2.

Mechanical characteristics in respect with the maximum permitted brake forces applied on the friction element form part of the parameters that characterise the area of use of the friction element for wheel tread brakes. The tests to determine these values are mandatory within the assessment procedure of friction elements.

Annex T of EN 16452:2015 provides basis for the shear strength and flexural strength tests described in the ERA TD. These tests use the value of the maximum permissible braking force applied at the friction element to determine its conformity in respect with mechanical characteristics resistance.

2.10.4 Chapter 7 'Suitability for train detection by systems based on track circuits' of the ERA TD

This chapter specifies a rig test programme to determine the suitability of friction elements for wheel tread brakes for train detection by systems based on track circuits. Annex O of EN 16452:2015 provides basis for this test. The demonstration of this suitability within the assessment procedure is not mandatory. Nevertheless, the suitability/non-suitability of the friction element has to be recorded in the technical documentation.

The following rig test to demonstrate the suitability for train detection by systems based on track circuits is only applicable if the friction element is intended to be used in subsystems which fall under the following scope:

- *Nominal wheel diameters of 680 mm to 920 mm*
- *Friction element configurations 1Bg, 1Bgu, 2Bg, 2Bgu*
- *Mass per wheel ≥ 1.8 t*

The restriction of the scope of the rig test is caused by a lack of experience with testing friction elements of other parameters than those specified. If a manufacturer would like to test such friction element he has to use the procedure for innovative solutions (Article 10a and point 6.1.2.5 of the WAG TSI). Nevertheless, the manufacturer may propose the same rig test as specified in chapter 7 of the ERA TD if he considers that he has already gained sufficient experience to be sure that the test may be used even outside the prescribed scope.

Cast iron brake blocks are deemed to be suitable for train detection by systems based on track circuits.

Cast iron brake blocks need not be tested and their suitability for train detection by systems based on track circuits is deemed to be fulfilled.

2.10.5 Chapter 8 'Suitability for severe environmental conditions' of the ERA TD

The suitability of the friction element acting on wheel tread brakes for severe environmental conditions shall be tested in accordance with the test procedures set out in sections 8.1 or 8.2.

If the friction element is supposed to be suitable for severe environmental conditions, the demonstration of this suitability is carried out according to chapter 8 of the ERA TD. This chapter provides two possibilities: either a test run (based on Annex M of EN 16452:2015) or a dynamometer test (base on Annex L of EN 16452:2015).

The demonstration of this suitability within the assessment procedure is not mandatory. Nevertheless, the suitability/non-suitability of the friction element has to be recorded in the technical documentation.

In connection with the assessment of conformity of composite "brake blocks", despite their positive assessment in accordance with chapter 8 of Appendix O, special operational measures may be necessary in order to ensure their safe use in severe Nordic winter conditions. The European Commission and ERA are investigating the subject at EU level, which may lead to further recommendations. See: https://ec.europa.eu/transparency/regdoc/rep/10102/2020/EN/SWD-2020-240-F1-EN-MAINPART-1.PDF

Cast iron brake blocks are deemed to be suitable for severe environmental conditions.

Cast iron brake blocks need not be tested and their suitability for severe environmental conditions is deemed to be fulfilled.

2.10.6 Section 8.1 'Test run'

The average braking distances of the 'winter tests' at each speed and the average braking distances of the 'reference tests' shall be determined.

There are no acceptance criteria specified for the test run. The reasoning behind is to allow for different values of the characterising friction elements' parameters; the values need to be recorded in the technical documentation. Based on these values the applicant can choose the ones that suit the characteristics of his project. The intention is to widen the possible technical solutions pertaining to friction elements in order to allow for a technical development of the sector.

Harmonised acceptance criterion is defined in EN 16452:2015 - Annex M.4. If a friction element fulfils some of these harmonised acceptance criteria the manufacturer can optionally point out this conformity in the technical documentation relating to the friction element.

2.10.7 Section 8.2 'Dynamometer test'

The dynamometer test program to demonstrate the extreme winter braking properties is set out in table 6 and table 7 and is only applicable if the friction element…

The restriction of the scope of the dynamometer test is caused by a lack of experience with testing friction elements of other parameters than those specified. If a manufacturer would like to test such friction element he has to use the procedure for innovative solutions (Article 10a and point 6.1.2.5 of the WAG TSI). Nevertheless, the manufacturer may propose the same dynamometer test as specified in section 8.2 of the ERA TD if he considers that he has already gained sufficient experience to be sure that the test may be used even outside the prescribed scope.

During the tests described in tables 6 and 7 the following conditions shall be respected:

The conditions to be respected while performing dynamometer test programme to determine the suitability of a friction element for severe environmental conditions are set out in the ERA TD. They represent a generalisation of the conditions described in Annex L.3 of EN 16452:2015.

The test program shall be carried out three times and the establishment of the suitability shall be done for a maximum test speed of 100 km/h and 120 km/h as follows:

There are no acceptance criteria specified for the dynamometer test. The reasoning behind is to allow for different values of the characterising friction elements' parameters; the values need to be recorded in the technical documentation. The applicant can choose the ones that suit the characteristics of his project. The intention is to widen the possible technical solutions pertaining to friction elements in order to allow for a technical development of the sector.

Harmonised acceptance criteria are defined in EN 16452:2015 - Annex L.4. If a friction element fulfils some of these harmonised acceptance criteria the manufacturer can optionally point out this conformity in the technical documentation relating to the friction element.

2.10.8 Chapter 9 'Thermo--mechanical characteristics' of the ERA TD

At the interoperability constituent level (friction element for wheel tread brakes), in case the manufacturer chooses to perform the test to simulate 'locked brake' as specified in EN 16452:2015, the result of this test has to be recorded in the technical documentation as part of the area of use of the friction element for wheel tread brakes.

Locked brake test is described in Annex N of EN 16452:2015. The performance of this test by the manufacturer is not mandatory. Please read the guidance in this Application Guide provided for points 4.2.3.6.3 and 4.2.4.3.3 of the WAG TSI.

3. APPLICABLE SPECIFICATIONS AND STANDARDS

Annex 1 Voluntary standards

REFERENCE IN THE WAG TSI		*VOLUNTARY STANDARD*	
Element of the subsystem	*Point*	*Standard reference*	*Purpose*
Structures and mechanical parts	**4.2.2**		
End coupling	4.2.2.1.1		
Inner coupling	4.2.2.1.2	UIC 572:2011	The fulfilment of UIC 572:2011 gives presumption of conformity with the requirement in clause 4.2.21.2, for UIC couplings designed according to the design operating states considered in the leaflet.
Strength of unit	4.2.2.2 6.2.2.1	EN 15085-5:2007	Where applicable the fulfilment of the verification procedure of the EN 15085-5:2007 gives the presumption of conformity with the requirement in point 6.2.2.1 concerning joint techniques.
Integrity of the unit	4.2.2.3		
Gauging and track interaction	**4.2.3**		
Gauging	4.2.3.1		
Compatibility with load carrying capacity of lines	4.2.3.2		
Compatibility with train detection systems	4.2.3.3		
Axle bearing condition monitoring	4.2.3.4	EN 15437-2:2012	On-board system
Safety against derailment running on twisted track	4.2.3.5.1 6.2.2.2		
Running dynamic behaviour	4.2.3.5.2 6.2.2.3 6.1.2.1		
Structural design of bogie frame	4.2.3.6.1 6.1.2.1		
Characteristics of wheelsets	4.2.3.6.2 6.1.2.2		
Characteristics of wheels	4.2.3.6.3 6.1.2.3		
Characteristics of axles	4.2.3.6.4 6.1.2.4		
Variable gauge systems	4.2.3.6.6 6.1.2.6	EN 15827:2011 EN 17069-1:2019 Annex G of 'ETH de Material Rodante Ferroviario. Vagones, DGF-MFOM, 2009'	The methodology for the validation of bogie and running gear can be used for some aspects of the validation of the variable gauge systems. The validation plan defined in the EN 17069-1:2019 or in the

			Annex G of 'ETH de Material Rodante Ferroviario. Vagones, DGF-MFOM, 2009' could be used as a "code of practice" in order to perform the safety analysis resulting in the definition of the validation plan. The area and conditions of use of this validation plan should be taken into account.
Brake	**4.2.4**		
Safety requirements	4.2.4.2		
Brake performance - Service brake	4.2.4.3.2.1		
Brake performance - Parking brake	4.2.4.3.2.2		
Thermal capacity	4.2.4.3.3		
Wheel slide protection (WSP)	4.2.4.3.4		
Environmental conditions	**4.2.5**		
Environmental conditions	4.2.5 6.2.2.7		
System protection	**4.2.6**		
Fire safety – - Barriers	4.2.6.1.2.1 6.2.2.8.1		
safety - Materials	4.2.6.1.2.2 6.2.2.8.2	The fulfilment of UIC leaflets 430-1:2012 and 543:2014 gives presumption of conformity with the requirement in clause 4.2.6.1.2.2, for providing protection to the area above the brake blocks (e.g. wooden floor and running gear) in wagons fitted with cast iron wheel tread brakes	safety - Materials
Fire safety - Cables	4.2.6.1.2.3 6.2.2.8.3		
Fire safety - Flammable liquids	4.2.6.1.2.4 6.2.2.8.4		
Protection against electric hazard	4.2.6.2		
Attachment devices for rear-end signal	4.2.6.3		
Operating rules	**4.4**		
Maintenance rules	**4.5**		
General - Marking	**-**		
Longitudinal compressive forces	**-**	EN 15839:2012+A1:2015	Pass/fail criteria of longitudinal compressive forces effects for certain design of wagons and under certain operative regimes.

Annex 2 Guidance on marking

The table below provides further guidance on wagon markings taking into account the provisions laid down in WAG TSI, in particular with the view on the markings 'GE', 'CW' and the gauge marking according to clause 4.5.2 of EN 15877-1:2012.

COLUMN	*A*	*B*	*C 1*	*C 2*
Requirement	Fulfils section 4.2 of the TSI	Fulfils column A and point 7.1.2 of the TSI	Fulfils columns A and B and complete Appendix C of the TSI	Fulfils columns A and B and partly Appendix C of the TSI (see condition C.5)
Interoperability marking	Authorisation plate	TEN	TEN GE	TEN CW
Additional gauge marking(s)	Section 4.2 does not require a specific gauge marking	Point 7.1.2 (d): 'The reference profile must be allocated to one of the target reference profile(s) G1, GA, GB and GC including those used for the lower part GI1 and GI2.' Point 7.1.2 (h): 'The unit must be marked with all applicable markings in accordance with EN 15877-1:2012 [...]' EN 15877-1:2012, clause 4.5.2, requires the new gauge marking with 3 gauges defined in the keys. Key 1 is one of those required in point 7.1.2 of the TSI. Key 2 could be the same as key 1 or a smaller national or multinational gauge (e.g. G2). Key 3 is always the lower gauge.	In accordance with EN 15877-1:2012, clause 4.5.2: Key 1 = G1 Key 2 = G1 or smaller national or multinational gauge abbreviation in accordance with EN 15273-2:2013 Key 3 = GI1	Alternative 1 (criterion C.6 fulfilled): In accordance with EN 15877-1:2012, clause 4.5.2: Key 1 = G1 Key 2 = key 1 or smaller national or multinational gauge abbreviation in accordance with EN 15273-2:2013 Key 3 = GI1 Alternative 2 (criterion C.6 not fulfilled): In accordance with EN 15877-1:2012, clause 4.5.2: Key 1 = GA or GB or GC Key 2 = key 1 or smaller national or multinational gauge abbreviation in accordance with EN 15273-2:2013 Key 3 = GI1 or GI2
First digit EVN	4 or 8	4 or 8	0 or 1 or 2 or 3	4 or 8

Additional guidance is available in the document 'Wagon Markings – Guidelines' available in the GCU webpage: https://gcubureau.org/recommendations/.